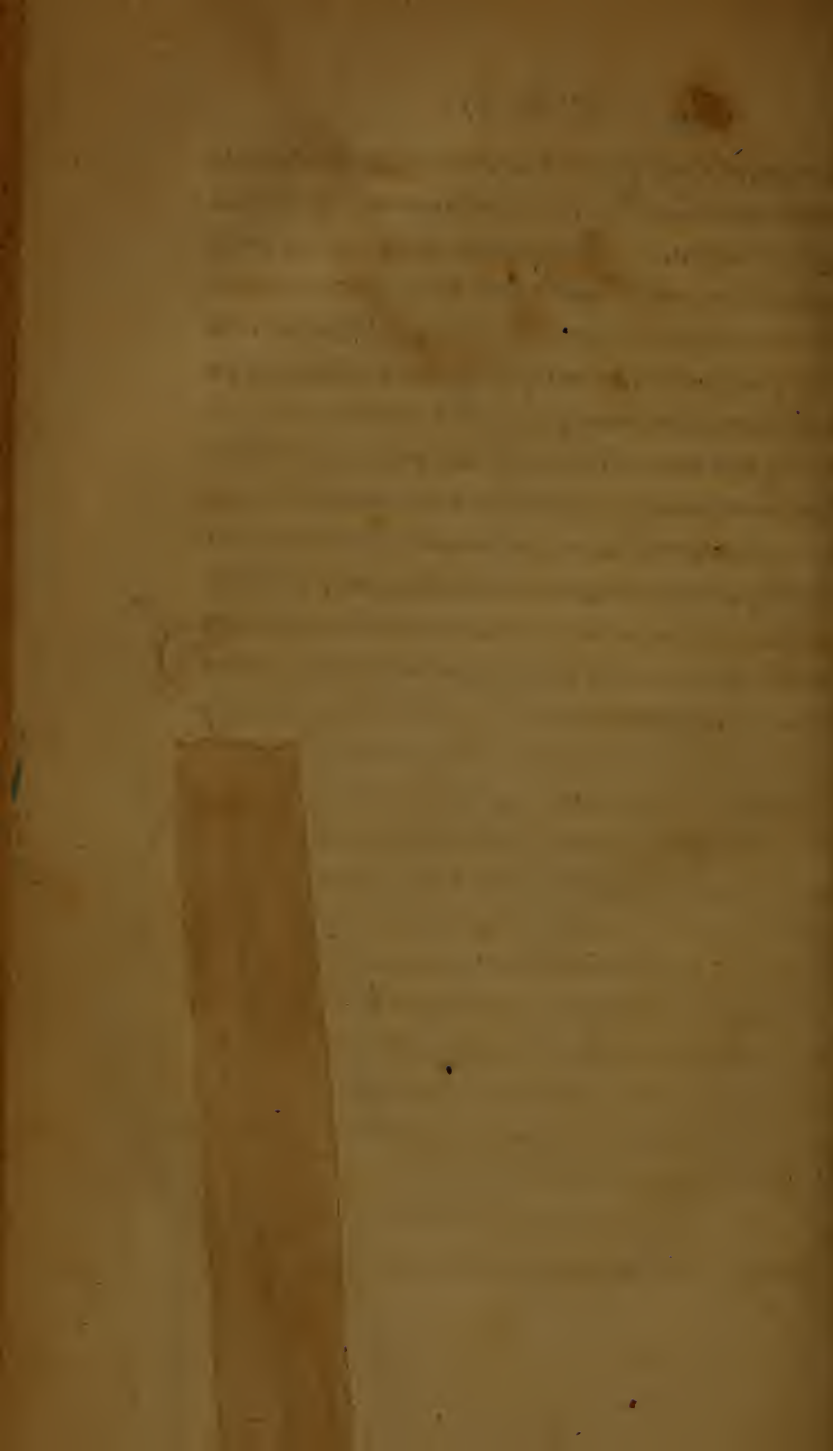




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PAPERS

FOR

1810,

COMMUNICATED TO THE

MASSACHUSETTS SOCIETY

FOR

PROMOTING AGRICULTURE.

PUBLISHED BY THE TRUSTEES.

Without encouragement of Agriculture, and thereby increasing the number of its people, any country, however blessed by nature, must continue poor.

SWIFT.

BOSTON:
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1810.

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CHOSEN JUNE, 1810.



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PREFACE.

THE Trustees of the Massachusetts Society for promoting Agriculture present to the public a collection of papers, which, though not wholly original, will, it is hoped, be found useful.

In the present condition of our country no object perhaps is dearer to the Agriculturalist and Manufacturer, than the importing and breeding of the Spanish Merino Sheep, the wool of which, for most uses, is incomparably the best in the world. The essay of lord Somerville, therefore, on the nature, feeding, and treatment of sheep is particularly valuable. In their last publication the Trustees offered a premium of 250 dolls. for the first five rams of the Merino breed imported pure from Spain, and the same sum for the first ten ewes. Notices of these premiums were made public in the newspapers and custom-houses generally through the State. The premiums for the rams have been claimed and paid. The first ram was brought from Spain by capt. Bartlet, of Plymouth. The next four rams were imported by capt. Knap, of Newburyport; and recently forty-seven full-blooded Merinos have been imported from Spain by Cornelius Coolidge, Esq. who claims the premiums for the ewes. These premiums will be paid on his complying with the condition, accompanying them, which was, that the sheep shall be sold to farmers within the state. These several importations have been probably made in consequence of the premiums offered by the Society. The value of this breed of sheep is now so well ascertained, that the high price at which they sell will be a sufficient inducement with future importers to bring them into the country, separately from any encouragement on the part of the Trustees.

Cultivators will be pleased and instructed by the account of peach trees, contained in these papers, as it affords hints for the raising and perfecting of the most wholesome and delicious of fruits.

Dr. Darwin's dissertation on the diseases of plants is curious and philosophical; and the abstract here given

is important, and calculated to awaken the attention of gardeners respecting the best methods of destroying deleterious insects.

The observations of the last mentioned author on fruit bearing trees, and on various modes of procuring and improving them, are highly ingenious, and merit the perusal of every horticulturist.

It would be needless in a country like ours to say a single word on the utility of husbandry. The yeomanry of Massachusetts cannot but know, that it is their only natural, solid, and permanent source of wealth ; and that it must forever supply the most substantial comforts of life to individuals, and the richest revenues to the state. But the Trustees would again repeat a request, already very often urged, that those, who themselves handle the plough in summer, would in time of winter exercise the pen, and give to the public the result of their labours. Let them state the success of their experiments ;—say if the common cause of rye being winter-killed does not lie in sowing new grain, instead of that which is one year old ;—if brush, to be effectually destroyed by the scythe, must be mown at a certain time of the moon ;—or if pumpkins growing in corn fields materially lessen the crop of grain. By remarking and communicating these and similar facts, they will increase the pleasure of tilling their grounds, the product of their toil, and the knowledge of their art in the community.

Boston, June 12, 1810.

PREMIUMS

OFFERED BY THE TRUSTEES OF THE MASSACHUSETTS
SOCIETY FOR PROMOTING AGRICULTURE.

1st. TO the person who shall discover an effectual and cheap method of destroying the Canker-worm, and give evidence thereof, to the satisfaction of the trustees, on or before the first day of June, 1811, a premium of *one hundred dollars*, or the society's gold medal.

2d. And a premium of *one hundred dollars*, or the society's gold medal, to the person who shall, on or before the first day of October, 1811, discover an effectual, and the cheapest method of destroying the Slug-worm, and give evidence thereof to the satisfaction of the trustees.

3d. To the person who shall produce the largest quantity of wool, meat and tallow, from the smallest number of sheep, not less than ten, raised on his own farm, a premium of *thirty dollars*; to be claimed on or before the 1st day of August, 1811.

4th. To the person who shall invent a cheap method of raising water, for the purpose of irrigating land from rivers and ponds from ten to twenty feet above the level of the same, and give evidence thereof to the satisfaction of the trustees, on or before January 1, 1811, *one hundred dollars*, or the society's gold medal.

5th. To the person who shall present to this society the most complete (being nearly complete) Hortus Siccus, exhibiting distinct specimens of the greatest variety of grasses, in general use, and specify, to the satisfaction of the trustees, their respective qualities, productiveness and usefulness as food for different kinds of animals, the gold medal, and *fifty dollars*; to be claimed on or before the 1st day of October, 1812.

6th. To the person who shall produce, from seed, the best growth of thrifty trees, not less than 600 in the whole, and in the proportion of 2400 to the acre, of any of the following kinds of forest trees, viz. oak, ash, elm, sugar maple, beech, black or yellow birch, chesnut, walnut or hickory, *twenty five dollars*; if all of oak, *fifty dollars*. Claims to be made on or before the 1st of October, 1812.

7th. To the person who shall ascertain by accurate analysis, the constituent parts of several fertile soils respectively, and in like manner the parts of several poor soils, and thus shall discover the defects of the latter; and shall show by actual experiments how the said defects may be remedied by the addition of earths or other ingredients which abound in the country, and in a manner that may be practised by common farmers, *fifty dollars*. And if it shall appear to the

satisfaction of the trustees, that, upon an extensive practice, the improvement of the poor soil would be more than equivalent to the expense of the improvement, the addition of *one hundred dollars*. A minute description of the several soils, and all the circumstances attending the processes, cultivation, and results, will be required. Claims to be made on or before November 1, 1813.

8th. To the person who shall, by actual experiment, on a quantity not less than half a ton, shew the best method of curing clover hay with salt; regard to be had to the quality of the hay, and the saving of labour, and the shortness of time between cutting and packing it in the mow, the silver medal, or *thirty dollars*; and to the person who shall shew the next best method, *twenty dollars*. Samples of the hay to be exhibited, three months after it is cured, to a majority of the selectmen, or to the settled minister and justice of the peace in the vicinity. Claims to be made on or before the last Friday of November, 1811.

9th. To the person who shall give the most satisfactory account, verified by experiments, of the effect of ploughing in green crops for manure, or not less than two acres, the silver medal, or *thirty dollars*. Accounts with certificates, to be produced on or before the first Tuesday in March, 1811.

10th. To the person who shall lay before the Board, the most satisfactory account of the application and effect of manures, verified by practical experiments, on not less than one acre for each sort of manure, the silver medal, or *thirty dollars*. To be produced on or before the first Tuesday in December, 1810.

11th. It is required that the communications, for which the foregoing premiums are offered, be accompanied with proper certificates from the selectmen, magistrates, or clergymen of the vicinity, or other vouchers, to the satisfaction of the trustees; that they be delivered without names, or any intimation to whom they belong; and that they be severally marked in such manner as each claimant shall think fit; the claimant sending also a paper, sealed up, having on the outside a corresponding mark, and on the inside his name and address.

AGRICULTURE.

THE Trustees of the Massachusetts Society for promoting Agriculture, impressed with the importance of giving to the public the best information respecting Sheep they could obtain, republish lord Somerville's late Essay on that animal, for the benefit of the people of Great Britain, shewing the advantages in improving the wool, arising from mixing and crossing the different breeds, and especially with the Merino Rams. Some observations are added of Mr. Lasteyrie and Dr. Parry; omitting only what is local and better calculated for that country than this.

AN

ESSAY ON SHEEP.

WITH a view to the improvement of our Short-Wool Sheep, and those more particularly belonging to our mountainous districts, hitherto neglected, I have thought it a duty incumbent on me to call the attention of my countrymen to this point, and have therefore ventured to publish a short essay on a subject which every man, at all acquainted with rural or political economy, must admit to be of the utmost importance both to our landed and commercial interests.

Assertions are to the utmost avoided, and conclusions are hinted at, which a close attention to the various breeds of our sheep, and the operation of our soil and climate on them, might with safety warrant.

The breeds of sheep in this kingdom may be arranged into two classes; those which shear the short or clothing, and those which shear the long, or combing, wool; of the former we have specimens in the South Down, Hereford, and Norfolk breeds, and of the latter in the Lincoln and Leicester. The quality of the flesh in each class, follows the character of the wool; the short-woolled sheep being close in the grain as to flesh, consequently heavy in the scale, and high-flavoured as to the taste; the polled, long-woolled sheep, more open and loose in the grain, larger in size.

Every practical man, looking over the map of England, who has given himself time to study the properties of its soil and climate, will admit, that one half the kingdom at least, is by nature appropriated to the short-woolled, fine-grained breed. He might with safety admit much more than half; for it at length appears, that our climate, from the most northern parts to the most southern, can grow wool of the finest possible quality. Taking into consideration the upland pastures, the light convertible tillage, the loamy soils, and mountainous districts of the kingdom, such a proportion must be admitted to be moderate and just. But notwithstanding the great importance of the short-woolled sheep to the nation, the whole attention, both of farmers and breeders, has for these thirty years past been absorbed in carrying to a degree of perfection hardly credible, the heavy, long-woolled sheep; such as Lincoln, Cotswould, Romney Marsh, and new Leicester, but more particularly the last.

To such extreme perfection has the frame of this animal been carried, that one is lost in admiration at the skill and good fortune of those who worked out such an alteration. It should seem, as if they had chalked out, on a wall, a form, perfect in itself, and then had given it existence. Nay, fresh technical terms have arisen to express points in these sheep, thirty years ago unknown : such as the "fore flank," and the "cushion," terms universally admitted.

Such is the animal now—almost the reverse of what it was ; and from whatever source it originated, whether from the care and nice observation of breeders, or from crosses with Ryeland or Dorset flocks, is immaterial. Wherever land is deep and strong enough to bear long-woolled sheep, there let them be bred ; but let them not be foisted by false arguments on land unable to maintain them ; by doing so the public is most essentially injured. Our combing and coarse wool-manufacturers must be supplied, and therefore our strong land should be allotted to carry coarse, heavy sheep ; but if, on the same false principle, one is to be pushed every where, to the exclusion of the other ; I, for one, am old-fashioned enough to prefer clothes to carpets, a necessary to a luxury. If carpets are to be exported, well and good ; they may perhaps pay as well as coarse woollens sent to South America, or elsewhere ; but if carpets are to be consumed at home, as they have been for some years past, the manufacturer indeed is fed by what he earns ; but for any addition to the national revenue, he may as well sit with his hands behind him, and at once be fed from the pocket of the richer classes : it is only receiving with one hand, and paying with the other ; the nation will not be enriched ; the same thing may be said of every article of luxury consumed at home. This is very unfashionable doctrine, without doubt ;

but it is too true. No desire of change, or love of innovation, led me to abandon the long-woolled sheep of my own neighbourhood, the Bampton breed dashed with the new Leicester; an undoubted improvement was visible from the introduction of the new Leicester. This stock continued to decrease in size considerably, in spite of all attempts, consistent with profit, to maintain it, notwithstanding fresh rams were three times brought from Leicestershire, in the twelve years these sheep were in my possession; the loss of size in each four years, amounted nearly to five pounds per quarter. It will naturally be asked, what sort of poor hungry soil this must have been, which could not maintain such sheep? It was the Vale of Taunton, proverbially known to be one of the most fertile spots in this kingdom, and much of the grass land, in which these sheep were depastured, was equal in strength to any in the Vale; it stands valued at 2*l.* 15*s.* per acre.

A man must be blind who could withstand such evidence as this. Nature pointed out that the stock was too coarse in quality, or our climate unfit, it matters not which: the fact was plainly marked, and it was merely an act of common prudence to follow her dictates.

How many thousands, how many tens of thousands of acres are there in Great Britain, which stand exactly in the same predicament! These sheep were sold; and the same land, which carried forty-five breeding ewes, was immediately stocked with one hundred and fifty Ryelands in their stead. The neighbours said they would all be starved; the winter was severe, but the ewes maintained themselves moderately well, and their lambs, at weaning-time, were in the very best order. The ewes were depastured on the high lands, west of the Vale of Taunton, during the succeeding summer, at the rate

of ten per acre, and came back into the Vale in good store state. One lot of these two-tooth sheep was bought by a farmer in the neighbourhood, and put in turnips; between Candlemas and Lady-day they were all killed; and on an average they turned out more pounds of rough fat, than they were pounds per quarter. Land of the Vale of Taunton might have supported coarse-wooled sheep in size, had they been pushed in first year's grass, or buried in red clover up to their knees, and the refuse mown afterwards for hay; but this was buying a good thing too dear; it is not the size of individual sheep, but the quantity of good meat and wool per acre which must enrich the farmer, and feed the public; and we wish to impress him with the conviction, that no breeds of sheep should be carried into districts ill adapted, both as to soil and climate, to receive them; that, in exertion to improve the carcase, he should not forget there is such an article as wool; that, in opposition to modern doctrines, the improvement of the one is incompatible with the improvement of the other; and that the breed of sheep which, on any given quantity of land, carries for a continuance the most wool, as well as flesh, and both of the highest quality, is that breed to be preferred, of whatever description it may be, or from whatever country it may come.

In pursuance of the object stated in the commencement of this Essay, the improvement of the fleece of our Short-Woolled Sheep, the author, in the spring of 1802, made a voyage to Spain, for the purpose of bringing home a flock of Spanish sheep. This attempt is not easily accomplished at any time, but is more than commonly difficult in a time of war. It was an object, not only to attain the sheep themselves, but the whole system of management adopted by those who had the care of these flocks in Spain. In both these particulars, the author has

been fortunate enough to succeed. The sheep we selected from a Trashumante, or travelling Merino flock, of undoubted high blood.* The rams, twelve in number, were picked from a flock of two hundred ; for, except the Manso, or bell-wether, the males are left entire, on a presumption that they carry more wool than wethers, and equally fine. The couples (ewes and lambs) were selected from a number proportionably large. Of the high blood and quality of this flock, the admiration of those shepherds, through whose flocks, twenty-two in number, they passed in the course of their journey, about the end of March, was sufficiently indicative, if not otherwise established. Of their properties as to carcase, and, which is equally material, their power of living hard, so as to carry much wool and flesh on a small surface of land, it will be as well to draw a conclusion from fact, rather than from assertion. That must not be deemed a bad breed of sheep, which, after a trial of some centuries, can maintain its high quality of wool, making two immense annual journies, and in a less space of time than could well be supposed, more especially when we recollect that the first journey commences when lambs are four months old, or even less. There are few breeds in this country that could support such periodical marches for any length of time, and not suffer materially in the form as well as quality of the carcase, for both are inseparable, being, as before observed, fed from the same sources.

Before any opinion is offered as to the qualities of

* The flocks bearing fine wool in Spain, are distinguished by the appellation of Trashumante ; and so called from travelling from one end of the kingdom to the other ; wintered in Estramadura, and other warm provinces ; during the summer months they graze on the mountains of Castille, Leon, and Asturias. On the contrary, those flocks which are always stationary, are, for that reason, called Estante, and belong to the provinces of Estramadura, Molina, Cordova, and other districts.

this celebrated stock, (and if any opinion be offered, it will be done with extreme caution,) the author thinks it may not be amiss to say, that from the general character of this breed, as to deformity of carcase, he was prepared to find them worse than, on examination, they proved to be. Nor is this deformity to be wondered at, when we recollect that this nation breeds for the wool alone, careless of the carcase, which, if ever so handsome, from local circumstances, would bear little proportion to the value of the fleece : so with us, we have sacrificed all to the carcase, regardless of the fleece ; whilst any man, who attentively goes to work, may realize both wool and carcase, without the possibility of injuring either.

The Merino fleece is, in colour, unlike that of any English breed. There is a dark brown tinge on the surface of the best fleeces, amounting almost to a black, which is formed by dust adhering to the greasy, yolky properties of its pile ; and the contrast between it and the rich white colour within, as well as that rosy hue of the skin, peculiarly denoting high proof or aptitude to fatten, surprise at first sight. The harder the fleece is, the more it resists any outward pressure of the hand, with certain exceptions, the more close and fine will be the wool.

Merino sheep have two properties ; the first is, that the males have horns, and that the ewes have none : the second is, a tendency to throatiness, that is, a loose, pendulous skin under the neck. The former are patient, as stock to occupy land, without the slightest tendency to break out, or to wander, peculiarly the reverse ; but courageous when set on to fight, and vigorous in all other useful and essential points beyond all example. The ewes are easily inured to their layer, and in all respects quiet and peaceful. If any general principle can be estab-

lished, as to perfection in any race of animals, it is that the males cannot be too hardy and resolute, or the females too gentle and tractable; a disposition to restlessness and irritability, I consider to be a very dangerous quality, and to be avoided altogether.

On their first importation, there was a great deficiency of milk in the ewes, as well as a tendency to barrenness, which is now ascertained to have arisen from the severe journeys to which this race of sheep is twice in the year subjected, when in Spain, and to which their valuable properties have been blindly attributed. They are now regular in their time of lambing; their udders are as full, and they are as good nurses as any sheep I have ever seen. It was not till some years after their arrival in this country, when they had become inured to the climate, that any instance of double lambs occurred, now it is not an unfrequent occurrence.

That power to influence the character of a flock, which is said to exist in the male rather than in the female, is here apparent, first, inasmuch as the polled rams of this breed, which are occasionally to be found, if descended from a polled ram, will produce male stock having a tendency to be without horns, or at least to have only snaghorns; and, on the other had, the get of the Merino ram, on shearling ewes got also by himself, have a strong tendency to horns, almost equally so with the wethers of this breed, which resemble very much the small original Dorset wether; for this reason, I judge that a cross between the best shaped Merino ram, and the old Dorset ewe, will be excellent, because the outward character being much alike, the want of quantity and quality of wool, in the Dorset breed, will be corrected in the most striking manner; this tendency in the Merino sheep, to grow wool in abundance, must add materially to the health of the flock, by covering the

most vital and tender parts of the body, namely the belly and the breast. And it should seem we have the means of carrying the Spanish fleece into the horned breeds of this island, by means of the ram, without destroying the existing character of the breed, whatever it may be; an object of no little importance in the eyes of farmers. For it is observable in crosses of horned ewes with polled rams (natts,) that the females are usually polled and the males horned; it possibly may not be so in all breeds, but the author has seen it in crosses between the Leicester ram and Dorset ewe; he has also proved the fact to be so, by a cross between the Bampton ram and Dorset ewe; indeed, to establish this fact was the only object of such a cross. The same, therefore, may be practicable by means of the ewe in polled breeds; such as the Ryeland, South Down, and Berkshire natts, sheep themselves probably of the same class, but varieties as to other short-wool breeds, inasmuch as they have the fine fleeces and fine skins of our horned breeds; and, above all, they will stock as hard as to weight of fleece and mutton per acre, more especially the two first mentioned. The effect of a Spanish ram on the fleeces of a horned flock such as the Dorset, the Welsh (a sheep of neat frame,) on the Wiltshire, the Norfolks, the Dartmoor, the Scotch, and indeed the whole race of horned mountaineers, will be neither more or less than a very great increase of profit on the fleece, with very little, if any, injury whatever to the form of the animal. And when we consider, that the fleece makes an annual return, the rental as it were, and that a quick return is allowed to be the farmer's best object, while the carcase, like the fee, can only be once sold, we may express alike our surprise and regret that such fatal supineness should have thus

long prevailed, on a subject of the most manifest importance, both to the tenant and the landlord.

The second property to be noted in this breed, is a tendency to throatiness, a pendulous skin under the throat, which is generally deemed a bad quality in this country, and the very reverse in Spain, where it is much esteemed, because it is supposed to denote a tendency both to wool and to a heavy fleece; this property is usually accompanied with a sinking, or hollow in the neck.

In every breed of this kingdom which has come under the author's examination, and there are few to which he is a stranger, he has invariably found the throaty sheep not good in their skins, with every symptom of turning out ill in their proof, (that is, evincing no aptitude to fatten,) with exception of the Ryeland.* This last, like the Spanish breed, carry wool of such high value, as to counterbalance the ill impression of throatiness. Their skins are full as good, and, in some instances, more clear and rosy; a point of infinite importance in sheep, and a sure token of vigour, and consequent disposition to fatten. Among the shepherds in Spain, this property is very much esteemed; and they persist in commending it as an invariable symptom of health, always denoting a good skin, and a tendency to abundant wool. These rea-

* In treating of Ryeland sheep, it may not be amiss to remark that they are not a mountain sheep, as many suppose, but are bred in the vales of Hereford and Ross, on the very same land with the Hereford oxen.

How many favorite theories will be knocked on the head by this one fact! If the same land breeds the smallest and finest woolled sheep, it breeds also the largest oxen in our kingdom. A country must be envied, which, without minute attention to the science of breeding, can turn out two opposite animals in size, so good in their kind. It teaches us that more dependance is to be placed on the breed or race of animals than we are at first aware. We offer no comment on circumstances seemingly so contradictory; excepting these sheep are usually kept in small flocks, and run on the summer fallows, and in other respects extremely hard.

sons are substantial enough to bring into repute any property whatever, and are strictly applicable to every sort of breed, in every country, as far as relates to wool.

Nor is it possible for any good judge to reject, on the score of carcase, a sheep whose skin is of this complexion, when accompanied, as it is, with a constant aptitude to quick proof. It was necessary to speak clearly on this point, for such a property must at first offend the eye of our farmers; but, when unattended by those bad symptoms above-mentioned, will probably cease to be an object of offence. By drafting the most faulty ewes, and a due attention to the rams, the throatiness, and the sinking, or hollow in the neck, which usually accompanies it, can be got rid of; so that, in a few years, it is probable few traces of them will be found. If they are faulty in these points, they are level on the back, and behind the shoulders. There is no reasonable foundation to conclude that a deformity in the shape is essential to the production of good wool; the fact is not so.

Attention has not been paid, in Spain, to the form of their sheep; and it must be evident to every judge of stock, that a journey from the mountains of the north to the plains of the south of Spain, cannot be otherwise than productive of more injury to the frame and constitution of the animal, than of benefit to the fleece, which, like the frame, is dependant on and nourished by the blood. Does it stand to reason, that a long drift of four or five hundred miles every spring and autumn, and that at the rate of eighty or a hundred miles per week, can be beneficial to sheep? Undoubtedly not. Have we a single breed which could support it uninjured? None, which would not have been hunted into deformity.

So far from thinking hot climates necessary to fine

wool, we know that coarse-fleeced sheep are to be found in many parts of Spain; that in Portugal, wool, unmixed with Merino blood, is, of the coarsest quality, worth about 1s. 2d. per pound. We know too, that after shearing, every pile is coarse, and improves, both to the eye and touch, as the autumn advances. No race of sheep has ever been seen, even in this northern climate, to be more impatient of heat, or more oppressed by it, than the Merino. By due attention to food; by moderation and equality of keep; by shelter in the winter months; and by those common regulations which induce health in the animal itself, we shall stand as high, as to the produce of wool and meat, as any nation in Europe. One inference may be clearly deduced from the long drift and yolky fleece of the Merinos; namely, that they are equal, if not superior, to any breed in these kingdoms to work in the fold. We may add, that the length and thickness of wool covering their belly and hind legs, together with a closeness of pile on the back and loins, must of necessity enable them to support more severity of cold and wet than any breed as yet introduced among us; unless we admit, that length and fineness of wool are inseparably connected with weakness of constitution, which evidence from all quarters forbids us to do. With respect to the yolky fleece above noticed, this property alone demonstrates the superiority of this wool to all others, for every purpose of clothing manufacture; and as it is occasionally found in other breeds of short-wool sheep, I think it right to enlarge a little upon it.—By “yolk,” is meant that yellow substance which escapes from the skin, and is to be found in the wool of every Merino sheep, when in health and good condition. This singular property it is which qualifies wool for the milling or felting process, and which, in

fact, makes the difference between good and bad cloth. It is the surest symptom of health in sheep; and I cannot help considering it as similar to those wholesome secretions in other animals which are the invariable concomitants of health, if not carried to excess: I mean that cold dew which we find in the nose of the ox and cow: this moisture dried up, is the first and surest sign of fever; so, in the human species, when the nasal discharge is regular, health prevails; in fever, it constantly disappears. I may be mistaken in calling these properties analogous; I am not in stating that they are severally the surest criterion of health and disease. When a sheep is fatted, this yolk is thrown out in an increased degree; and, in our English breeds, would probably be attended with a deterioration of the wool; but in the Merino race of sheep, as far as my practice has gone, it adds only to the length of the pile. I see no deficiency of yolk in Merino sheep in England, well kept and inured to the climate; and I am decidedly of opinion, that it is the best proof we can have to guide us, that any climate is not too severe, whilst the yolk rises. If it will rise in Lapland, Merino sheep will prosper there.

In other respects, these sheep are not much unlike some English breeds. The rams, indeed, have a buff tinge in their countenance; they may reach 17lbs. a quarter, when tolerably fat; the ewes are not low on their legs, are very fine in bone, and may reach 11lbs. a quarter. There are various opinions as to their origin; Mr. Tollet thinks it may be traced from Asia Minor and Greece, into Italy; from thence, probably, into Spain. Columella, and other writers, call them "Tarentine sheep," from the city of Tarentum. We have it recorded, that they originally came from England in the beginning of the fourteenth

century: be this as it may, it is high time they return to it again: for although there are different opinions as to their origin; within a few years there will be but one as to their value.

As to distempers, I know of none to which this breed is peculiarly subject. It has been said, that they were subject to constant foot rot; it is infectious, if sheep once affected are suffered to remain long in the flock; but originates in the corrosive properties of the night dews and exhalations arising from them, as I judge, and not from animalcules, as some have supposed. In Spain the flocks are never let out of the fold to feed, until the departure of the morning dews, which are deemed prejudicial to sheep, and may in part occasion that well-known disorder, the rot in the liver. There is little doubt, that it is the immediate occasion of the foot rot, which, in this climate, rarely makes its appearance before St. Bartholomew's day (the 25th of August,) when the dews usually begin to make their appearance, as is expressed by the old adage—"St Bartholomew brings on cold dew." The remedy, if instantly applied, is certain;—a caustic wash rubbed in between the hoof, will stop the stripping of the skin, and the horn of the hoof toward the toe being cut away (so as to see the clear transparent horn,) leaves no room for this foetid substance to get hold of the foot. Great care must be taken, not to cut away the extreme point of the hoof called the "toe-vein," because it deprives the foot of due circulation of the blood; in other respects, the foot cannot be pared away too close: when the corrosive styptic has been rubbed in, let the sheep be kept in a dry place, to allow the remedy to have its due effect; and separate the stripped and lame sheep from the flock for two days, and the disease will disappear: if it is to be seen for more than

forty-eight hours in the same animal, it is generally the fault of the shepherd. The disease has been supposed inherent in the land: I am of opinion this is not the case, because I know that land, supposed to be deeply tainted, has lost (judging from the sheep depastured on it) all vestige of the disease, although unbroken, and not even manured on the sward, which happened to be very old. On that part of the author's farm on which the Merino sheep usually depastured, the foot rot prevailed to the greatest degree when occupied formerly by the heavy long-wool sheep of that district; it has been completely subdued for several years.

They are subject to no constitutional disease, from which other breeds are exempted after the lambs have weathered the first three weeks, and even during that period, only from the shortness of the wool when first dropped, a difficulty to which all fine-wooled sheep are subject.* But it requires no remedy beyond that common caution practised by all the careful flock-masters of South Britain, namely, without shutting up the ewes and lambs in close confined buildings, which are injurious, to drive them into some sheltered homestead, out of the reach of the cutting blasts of wintry winds and drifting snows, which even in the southern parts of our island, make dreadful havoc where flocks have been left so exposed. I

* Nature seems to have guarded with peculiar care this race, as if conscious of the value of what in her bounty she was giving to man; for, strange as it may appear, it is no less true, that when they are first dropped, the lambs are covered with a long down or hair, which, in the period of a month, falls off, and is a sure prognostic of the finest quality of wool. Whether this extraordinary covering is thicker, or more frequently found in cold climates than in warmer ones; or whether it classes them thus next in gradation to the Lama, or those other animals which, under a hairy covering, carry that downy wool so celebrated in Asia, is a question rather for the naturalist than the husbandman.

know of no farmers more attentive to this substantial good husbandry, than the farmers of the South Downs. In Spain the sheep are carefully housed during the night, or in cold raw weather, for some days after shearing; they are sweated a day or two before this operation, to make the wool part well from the body, and, perhaps, to add something to the weight. If, in one uniform temperature of climate, this treatment is essential to the health of sheep, and beyond a doubt it is so; how much more is it necessary in the variable and uncertain climate of Great Britain? Yet numbers of us have never given a moment's thought, to what we may suppose would be self-evident to men of any capacity whatever; although we cannot command a temperate or steady climate, much of its severity may be counteracted by cheap and simple means. In the mountainous or hilly districts, essential benefit to the wool may be derived from attention to aspect and elevation, as well as soil; and where this attention has been paid, wool is of a superior quality. It is also familiar to every farmer whatever, that the value of the carcase is much influenced by an attention to this circumstance: by stocking the higher ground in summer, where fresh air may be found; and low, well sheltered lands, lying to the south, when winter advances; but though known, this is for ever neglected in practice.

Sheep, in some vales, particularly of the southern and western districts, where inclosures are small, and the circulation of fresh air impeded, will pay little or nothing during the summer months, let the keep be ever so good, owing to the heat and that instinctive terror which they have of the maggot or blow-fly. In the three winter months again, all men consider themselves fortunate, if their store flock lose nothing in condition. Reasoning on our own knowledge,

and on facts long established, need any stronger argument be adduced to show, how attentive we must hereafter be to such a system, if we had not at this hour, sheep in every part of the kingdom dying by thousands of cold, and want of keep? It is cheaper to feed the outside than the inside; yet plain as all this seems to be, the practice is rarely, if any where, to be found but in Herefordshire: therefore it is, that the Ryeland is next in quality to the Spanish wool; and Spanish writers themselves confess it.

It must not be supposed, that I am suggesting costly buildings for the purpose of coting sheep in the night-time during cold weather; two objections arise to them; they are not moveable, and may want fresh air, unless high and large, for air and warmth are equally necessary to sheep at these seasons. Nothing can be more simple than that cot or covered fold I wish to recommend for general adoption during the cold months.

A circular wall 12 feet high, inclosing an area of 40 yards diameter, and on the inside of this wall, a shed, the roof of which slopes inward with an easy descent to 6 feet, will completely shelter a flock of many hundred sheep. The excellence of the South Down flock, occupying a yard in a chalk pit, contrasted with the economy of its accommodation, cannot fail to do credit to the good sense and good management of Mr. Boys who farms it. Where snow is likely to be drifted, such pits should be protected by a mound or bank round the top; this precaution would be requisite also as a security to stock depasturing near it.

Not a shadow of doubt rests with me, that in the course of a few years, under such management, whatever the breed of sheep may be, the wool of the young stock will be much improved in quality, and the carcase kept up at a reduced expense.

Lest it should be surmised, that the facts here stated, and the conclusions which every judge of sheep will thence be led to draw, should have been formed on a scale of practice too confined, it is advisable to suggest, that the flock consists of 340 breeding ewes, and the whole produce at two years old, is fatted off, with the exception of such draft ewes as may be sold for stores; * consequently the number of the sheep is from 1000 to 1200; a scale not of the largest, but still large enough with safety to warrant any inference that may be drawn. The lambs are dropt in the Vale of Taunton, and continue in it during the first summer. The store flock is summered a short distance from thence, on the hills bordering on Exmoor Forest. The contrast of climate must be remarkable, because there is a difference in the time of harvest a month: our feeding-sheep are then grazed in the exposed, but rich marsh of Bridgewater, long celebrated for its good beef and fat oxen; and although this land had the character of being too strong, and of scowring lambs, even to the danger of losing them, we found the mixed breed able to endure it, and thrive surprisingly. Whether

* It has been deemed the criterion of a good and profitable breed of sheep, to ripen early, because there is room to multiply such breeds, far beyond those of slower proof. If a sheep can come to market at two years old, his fleece will be long enough for our manufactures, and not sold at an inferior price as skin wool; much before this period, it would be unfit. The growth of any high proof breed of sheep, is far greater the first and second than the third year; therefore it may be urged, that more profit can be had from the animal at this time, than at any later period, its growth and fleece considered. If attempts had been made to bring into general use a breed of sheep, whose fleeces were of value, but incapable of getting fat, we should be receiving with one hand, what we were throwing away with the other; no general benefit could result: but when we bring sheep bearing such heavy fleeces, and that wool capable of making broadcloths and kerseymeres, of quality sufficient to obtain the Bath Society's premiums, and of a proof or aptitude to fatten equal to, if not exceeding any short-woolled sheep we have, the principle is no longer to be controverted; it must be considered a breed of extreme value.

as an article of food for those, who are robust, or those, who are delicate, even at the early age of 18 months, when mutton is usually thought indifferent, it is nutritious and exquisite in flavour. There is a firmness in the spine fat; a richness and deep colour in the gravy; and a fine texture and tenderness in the grain, which must command customers, and ensure to this breed the good will of butchers, wherever they may be situated. There are two parties to be considered, the seller and the purchaser. We have had occasion to note, how essential a ready sale is to every article of produce, and that this circumstance, in great part, tended to enforce the necessity of a change of breed. These diversities of soil and climate, unequalled, probably, within the same space of ground, enable us to speak with a confidence, it would be presumption otherwise to do; because together they embrace all those leading varieties, which, some certain spots excepted, are to be found in the whole United Kingdom.

The quantity of stock hereafter stated to run *per* acre, may appear great to many persons: some may be disposed to doubt the facts. Every possible precaution to ascertain them, has been taken, and to speak with as much accuracy as can be, where we are to reason on an average. My wish was not to deceive myself; I trust it is not in my nature wilfully to deceive others. The Ryeland sheep, alluded to, were summered at 2*d.* each *per* week by my own tenant that season; we know the fact to be correct, which he has repeatedly confirmed by declaring, that it was the exact average *per* acre. In the marsh, such a stock in point of numbers, of fat and store sheep, has been carried, as would be found almost to exceed belief. The fattening wether-hogs and draft store ewes, which must be to make the most of them,

kept as high as fat sheep, amounted to more than four *per* acre, during the six summer months; the store ewes amounted to more than two *per* acre, and were large, strong South-down ewes, of Mr. Ellman's blood, in all more than six *per* acre, besides refuse lambs, &c. &c. and nothing could exceed their proof. In the winter of 1800 the Vale estate carried, from the beginning of September, to the first week in June, 700 store-sheep, about 250 lambs included, on one hundred acres of pasture land, of which sixty were indifferent, and forty as good pasture land as could be seen: the ground carried more stock; probably from the mode of depasturing. Where sheep work in the fold, they must run in large lots; and some loss *per* acre in the stocking may be incurred, because the profit of the fold is great; but where folding is not practised, and the country much enclosed, sheep should be stocked in small parcels, thin on the ground, and frequently changed: the land thereby is not stained, and one lot follows another in perpetual succession. Every judge of stock knows the value of change, even, occasionally, into worse keep. It is our fixed belief, that we can carry six and a half Ryelands, *per* acre, on land (free of any local consideration) worth one guinea and a half *per* acre, with the help of some turnips and pease-haulm in the dead winter months; and that with judgment in the manner of stocking, we shall neither push them beyond their growth nor make them meat for the butcher, but shall maintain them in healthy store-state. On the same land, and under the same circumstances, we can carry four South-downs, or their cross, and somewhat more *per* acre. If our Ryeland ewes will fatten to twelve pounds *per* quarter, our South-downs will reach nearly eighteen; the rate of stock *per* acre will, therefore, be

found the same in proportion to the size.* The quantity of good mutton and wool *per* acre, must be the only test of good or bad management: it is on the increased stock of South-downs, which his estate in Norfolk now carries, that Mr. Coke prides himself. A noted husbandman from Nottinghamshire is said to have declared, that he never before saw an estate so stocked.

The South-down stock, which is now reared on a farm of the Duke of Bedford, called Maulden, in Bedfordshire, the nature of the land considered, will be found to exceed that which belongs to myself. A very few years ago, great part of this estate was wild, unproductive heath, valued at 2s. 6d. *per* acre. A Norfolk farmer was invited to take it, but declined any engagement, at any price. Four hundred acres of it have been broken up. Its situation was such as to preclude all extra manure, therefore the estate is making itself by the sheepfold; it now carries 400 breeding South-down ewes, the stocks amounts to 1200, and the fat sheep finished on the same: there remain about 150 acres only of heath to break up, at which time the estate will carry 1600 sheep. The South-down stock is large in size, and of the first-rate quality; the land cannot now be valued at more than ten shillings, and the stock three, *per* acre, winter and summer. We should rejoice to see any improvement more substantial, or more beneficial, than this; for it is to be remembered, that, in proportion as the sheep-stock increases, heavier and better crops of corn will be grown. The average of South-down store stock on Mr. Ellman's pastures at Glynde, he asserts to be four *per* acre; as his sheep are of the largest size, this rate of stocking

* The wethers of each breed will be, of course, some pounds heavier *per* quarter.

will be found exactly similar to our own. He could not afford to starve his own sheep, because they are too valuable to make the difference of feed of the slightest consequence.

The principle, on which Sir Lawrence Palk conducts his sheep husbandry, needs only to be recorded; it will speak for itself. Part of his estate is rich land, improved by water (which heretofore ran to waste,) and lies low in the vale of Exeter: the rest borders upon Haldown. Instead of stocking the whole with the heavy bodied sheep of the country, which either must have been stocked so thin *per* acre as to pay nothing, or have dwindled in size, or have been starved, the estate now carries 500 breeding ewes; on the lower, 200 of the new Leicester blood, and on the upper part 300 Ryelands, the produce of which have a large portion of the Merino blood.

As the winter advances, and the heavy-bodied sheep go into turnips, the Ryelands are brought down to run after and clean up the layer, by which they get well wintered; and as the summer approaches, they return to the high lands and work in the fold.

If any man can devise a system, which, under such circumstances, will pay more in good produce *per* acre, let him suggest it: his information will be thankfully received. But it will be urged, Why is it that these men should do more than we do? Why do not we draw from our management as much for the public supply? Because you are tied down and fettered by old prejudices, adverse to your interest; and because they, profiting by a more extended education, reason on a greater scale, and act on principles more consistent with nature and good sense. It is by the neglect of, or by an unremitting

attention to, this great secret, in rural economy ; and, by the adoption of animals for husbandry labour, which do not consume our food, but, on the contrary, add most considerably to it, that the national supply will be either scanty or abundant.

The question having of late been repeatedly asked, What proportion of the Merino blood it would be adviseable to bring into the South-down breed with advantage ? My answer has been—One quarter only, provided the outward resemblance and character of the South-down is intended to be preserved ; the Ryeland, being a white-faced sheep, assimilates with the Merino more readily, and will bear one half, or even more.

From the foregoing observations it will appear, that, in its common application to British husbandry, the Spanish breed of sheep has the power, perhaps exclusively, to maintain its quality of wool ; for, strong keep will lengthen, but will not open or deteriorate the pile ; that it has, without question ameliorated the quality, and what is of more importance, has added considerably to the quantity of our native short-wool fleeces, whilst, at the same time the proof or aptitude to fatten has increased rather than diminished. Supposing, then, that no great improvement in the shape should be obtained, it becomes to any man simply a question between his eye and his pocket ; if he must have beauty, and that, too, of an unwieldy description, let him have it ; but if he prefers profit, which is supposed to be the more substantial acquisition of the two, he knows where it may be found. A trite but wise adage says, “ Handsome is, that handsome does.”

He was a bold man, who first ventured to introduce among us an Alderney cow ; and he must have

had an eye stedfastly fixed on this adage for consolation; yet the event has justified his hardiness. Just so with these Merino sheep; but, as other breeds have been improved, so by careful selection may these; for the foundation, good wool, and good and early proof, are not deficient.

This race of sheep has retained all its quality of pile in Saxony, as well as in Sweden and Denmark, where it has been spreading for 50 years past; in proof of which, 200 bags of Merino wool, scoured and sorted, were imported some years ago into this country, by one person, and the whole of it sold at the prime price of Spanish wool: when manufactured into cloth, it worked up as well, as it looked in sample. The exertions M. Lasteyrie, in his late work (*Histoire de l'introduction des Moutons a laine fine d'Espagne, dans les divers Etats de l'Europe, et au Cap de Bonne Esperance*) must not pass unnoticed; his knowledge has obviously been obtained in the sheep-fold, and the fluency and correctness with which he details the various diseases of sheep, and their remedies, declare him to possess a shepherd's knowledge of a flock.

In his commencement of the subject, he expresses himself thus: "The different governments of Europe had long acknowledged the advantages that would be derived to agriculture and commerce, from the introduction of fine wools into their respective states; but their views meeting opposition in the ignorance and prejudice of the times, a considerable number of years elapsed, before they set about realizing an idea, which, at first, seemed chimerical; at length there appeared men equally commendable for their patriotism and for their knowledge, who have laboured with zeal and perseverance, to enligh-

ten their fellow-citizens, by producing facts to prove, that nature, far from opposing itself to the preservation of fine-wool sheep in certain climates, seemed, on the contrary, to lend itself complacently to the exertions of industry. I believe I have demonstrated in my Treatise on Sheep, that the fine wools of Spain depend neither on the voyage, nor on the soil, nor the climate, nor the pasture; but that it depends on other causes, and that it is possible to have in France and elsewhere, wool of the same quality as that of Spain. My travels in the North of Europe have offered facts and observations, which have afresh demonstrated this truth. I have found in the far greater number of the flocks I have examined, wool, which, judging from the eye, or the touch, equals in beauty and fineness that of Segovia and Leon; so much so that, in my opinion, no doubt can remain, that we can obtain superfine fleeces in every part of Europe, where pastures are to be found, and where we can depend on winter food, on which sheep can be supported. These wools make cloths as fine, as silky, and supple, as those manufactured of Spanish wool, as attempts made in France, and other countries prove. But were it true, that the food, climate, and other local circumstances, had a certain influence on the intrinsic qualities of wool, such as the elasticity, the strength, the softness, &c. &c. it would not be the less proved, that, at all events, cloths, fine and beautiful enough to satisfy persons the most difficult on this point, can be obtained; and that a nation can easily do without the fine wools of Spain, and feed its finest manufactures with those drawn from its own proper soil. Nevertheless, as these truths are still held in doubt by some persons, and lest these doubts should have a considerable influence on our agriculture and our commerce, I thought it

my duty to publish these facts, which must give a new degree of force and certainty. I here present to view the actual state of Merino flocks naturalized in Europe."

He says that a Merino flock came into Sweden in 1723; that from the year 1740 to the year 1780, a bounty of 75 *per cent.* was allowed to those who sold fine wool; in 1780, these bounties were reduced to 15, and 1786, to 12 *per cent.*; and in 1792, being no longer deemed necessary to encourage this breed, they ceased. In 1764, Sweden possessed 65,369 Merino sheep, of the pure blood, and 23,384 of the mixed blood: since that period they have constantly increased in number, in spite of the difficulty occasioned by the length of winter and severity of the climate. That the Merino sheep preserve, in Sweden, their pristine form; that the fleeces have lost nothing of their equality of length, their elasticity and fine quality of pile; that their weight continues as great as in Spain; that he has seen Merino rams whose fleeces weigh thirteen pounds each; and that, when seasoned to the climate and properly fed, he has seen them larger and finer sheep than in Spain. Upper Saxony, he says, is the country next to Sweden, where the introduction of the Merino breed is of the longest date; and it is in Saxony where this naturalization has met with the most marked success, and produced effects the most beneficial: the native breeds have, by a mixture of Merino blood, profited in an equal degree. The first importation was in 1765; the next in 1778. Mr. Lasteyrie says, he has seen many different flocks, and has found the pure Merino, as well as some mixed breeds, producing wool of the first quality; indeed, the sheepwalks of Saxony are, at this moment, more productive than any other species of husbandry; and that the wool sells at three times the price (*un valeur*

triple audessus) of the wools of the country. Saxony rears about 1,600,000 sheep; of which, 90,000 are Merinos, and the mixed breed.

They were introduced into Prussia by Frederick the second, in the year 1786. Some of these, distributed over the country, from mismanagement and gross neglect, have degenerated and died; others he has seen, which preserve their pristine qualities.

In Denmark, and in various parts of Germany, Mr Lasteyrie has seen this race of sheep always prospering, if well treated; and in this and every other country, degenerating from want of food and neglect; always, however, doing as well as the native breeds in the same keep, and in some cases better; that the more regular and ample the supply of food is, whether of grass or green vegetables, the heavier and finer will be the fleece, the larger in size, and more perfect in shape, will the sheep be. He strongly recommends housing; but adds, that foul, close sheep-cots are injurious; that a free circulation of air is always found beneficial; and that this breed of sheep suffers more from heat than from cold—(this doctrine has been repeatedly confirmed by our practice at home;) that they will get fat as quick as any indigenous breed, in any country, and have done so wherever a comparison has been made.

The details of the treatment of the Merino flock at Rambouillet, a national farm near Paris, merit notice; they appear to result from much patient observation. An experiment was there made, which denotes the peculiar character of this breed, and its tendency to carry wool. A ewe, eighteen months old, was left unshorn; the next season, her fleece, when shorn, weighed fourteen pounds ten ounces; and its pile, which was double the usual length, lost nothing as to weight, because few ewes would have given more wool, if clipped at the usual periods.

Another ewe was shorn at thirty months old, and gave a still greater quantity of wool, although she, at that season, suckled a lamb; her fleece weighed twenty-one pounds, and the pile was eight inches long. In the ninth year (1800,) eight ewes, whose fleeces were of two years growth, gave from sixteen to twenty pounds each. It appeared from these different experiments, that Merino wool, of two years growth, will double its length, and will preserve all its fine quality; it was not observed that the sheep subjected to this experiment, suffered particularly from heat, or that their health was in any degree injured.

It is possible that this property of the Merino fleece, to grow beyond the period usual in our breed of sheep, may be productive of some new manufacture, where great length and fine quality of pile is requisite; but the hazard of the blow-fly, and the chance of losing, in hedges and brakes, any part of a fleece, after it is once fit for a manufacture, will not allow of this practice becoming general, admitting even that the sheep suffer nothing in their proof during the summer months, from the weight of the fleece, which, in a large scale of practice, is improbable, and that the wool should be found to pay as well for growing to this length, as it would when shorn in common course; but we have taken the liberty of noticing a circumstance so novel to us, because our English breeds are all supposed to cast their fleeces at a certain season of the year, if not shorn, with exception to lambs, which hold their fleeces—(this is quoted by many as an argument against shearing lambs;) because the fact has also been doubted by some of the best informed and liberal amongst us, not supposing the reporters of Rambouillet meant to deceive, but that some mistake must have been made. A sample of this wool is

now in England; I have carefully examined it, and can bear testimony to the fact.

The Duke of Bedford, who left Paris at the moment when hostilities were about to commence, consequently the latest, as well as one of the most correct judges of the matter, declares that he carefully examined the Merino sheep at Rambouillet, and that he found them of a size he was unprepared to expect, and that still the wool preserved its original purity. Samples of the wool taken when the sheep first arrived, and at various periods since that time, were examined by him, with all possible accuracy, and evidently declared a progressive improvement. He thought the wether sheep, of the pure blood, might be fed to twenty-five pounds *per* quarter; a size beyond which, it will not be advisable to push them, unless vanity is to be gratified at the expense of profit.

M. Pictet, editor of the *Bibliothèque Britannique*, in frequent details of the success which attends these sheep, both on the national farms near Paris, and on his own, near Geneva, where his flock consists of 400 Merino sheep, says, in his 210th Number:—“In our Journal, we have given the fifth annual report of our flock of the pure blood, originally drafted from that of Rambouillet. It is now clearly proved, by the experience of a great many husbandmen, that the Merino breed succeeds remarkably well, and without degenerating; and that this valuable acquisition, which France owes, in a great measure, to the managers of Rambouillet, is fully established. The Merinos must keep their ground, from the very nature of things; for husbandmen will employ their capitals in the way they find the most advantageous.

“It is now almost unnecessary to publish facts which, with a little variation, are merely repetitions of what has before taken place; but, as the preju-

dices of husbandmen are very difficult to remove, in endeavouring to convince the incredulous it is necessary to lay before them all the proofs we possess; and there is always something new occurring.

“One hundred and fourteen store ewes (*brebis partieres*) of the pure blood, have reared 111 lambs (56 rams, and 55 ewes.) In the commencement of the lambing season (in the first fortnight of December,) we had ten miscarriages. I was from home at the time, and the only reason my shepherd could assign for this accident (a rare one in well-managed flocks) was, that the ewes had got a custom of leaping over a ditch in one of the enclosures. However this may be, the deficiency was almost made up, by ten of the ewes having twins, only one of which died.

“The quantity of wool has not been so considerable this year as last, probably owing to the coldness of the weather, or some particular state of the air, and of the pastures, as the same thing has been observed in other well managed flocks, and as my own has always been kept in the best possible state. The mean weight of the fleeces, of the store ewes, was 7lb. 1 oz.”

In a private letter, he says—“I have much admired the samples of wool you have caused to be directed to me; I like to see your perseverance gets the better of prejudices among your neighbours. The Spanish breed of sheep is a true mine, which the English have refused to explore till now. I don’t know whether I am mistaken, but I suspect in you a higher opinion of that breed than you were pleased to own. It seems that, in order to reconcile your prejudiced countrymen to the admission of these foreign sheep, you disguised them under the Ryeland and South Down cloak; and knowing that meat and fat are, in England, the necessary passports of good fleeces, you particularly insisted upon the carcase be-

ing not injured by the introduction of the Spanish blood. Is it your opinion that there will be more profit for you in crossing the Spanish rams with the Ryeland and South Down ewes, than in breeding the Spanish in and in? Have you any experiment which makes you suppose that a degeneration would take place by persevering exclusively in the same blood? Now, if there was no degeneration, (as I am led to suppose, by my experience, and that of many others in France,) would not there be infinitely more profit in keeping the pure Spanish breed, than by crossing? The reputation of that excellent breed cannot but increase and extend annually, in Great Britain. If the monopoly created by your wool laws, in favour of the manufacturer, was once abolished, the Spanish sheep would, no doubt, grow more and more popular. The advantages I experience, by the keeping of that breed, would certainly be still greater with you, since you have already hired out Spanish rams at one hundred guineas *per annum*; whereas, I could not sell them higher than twenty-five. You will see, however, in the Number of September, of the *Bibliothèque Britannique*, that the produce of my flock is immense, considering the capital. I should learn with great pleasure, that the number of these sheep is increasing in England; I shall say, in the terms of Washington, ‘the multiplication of useful animals is a common blessing to mankind.’ National jealousy on that point, is highly absurd. Industry has an immense field; and, if rival nations, instead of crossing each other in agricultural and commercial views, endeavoured to take the lead in useful improvements, and emulate each other in all good things, they would be reciprocally subservient to the prosperity of their neighbours, without hurting their own. There would be more happiness for all individuals, and

more people to enjoy it. So much for a dream ! I come to the samples of your flock.

“ I have, in my collection, samples of all English wools : Your Ryeland is comparable to most of the Spanish wool of commerce ; but the improvement is evident in the cross ; the half Ryeland half Spanish, has all the qualities of fine Spanish wool. There is one quality, which is peculiar to the prime Leonese, viz. an extreme softness, joined with strength and elasticity. All your samples seem to partake, in a high degree, of that quality ; and it is peculiarly remarkable in the cross of Ryeland. I take the liberty of sending here inclosed, a sample in the yolk, of one of my best rams. I have not yet met with a finer fleece among many hundred Spanish beasts * that I have examined ; as well those lately imported from Spain, as the flocks that have been naturalized these many years. That ram belongs to the seventh or eighth generation, born in France, out of the original flock arrived from Spain, always breeding in and in, with a remarkable increase of weight in the animals and in their fleece. These facts deserve attention. You may see in the last report of Tessier and Hazard, concerning the sheep of Rambouillet, the results of the comparison between the newly arrived Spanish rams and ewes, and the old stock issued from individuals drawn from Spain eighteen years ago ; I have seen the two flocks, and would have prejudged the fact as it is stated. In my flock the mean weight of the fleeces of the ewes of the Rambouillet breed, has been seven pounds twelve ounces (pois de mare) in the yolk. Now, the mean weight of the fleeces of the Spanish ewes arrived last year at three of my neighbours' premises, has been five pounds. As to the comparative fineness, no better

* A French idiom expressive of sheep.

Criterion could possibly be obtained, than the price fixed by the merchants and manufacturers in the public sale at Rambouillet. The manufacturers do not act at random, when they give a price full as high for that wool as for the prime Leonese, coming from Spain ; they have known its value, by repeated experiments, these many years."

M. Pictet is sometimes disposed to smile at our bigotted adherence to the outward form of our sheep, and to those properties which render them capable of becoming good mutton : but M. Lasteyrie does not quite give in to the idea of the Continent in this particular : he says, " the practice of certain good husbandmen in England would be attended with advantage, in my opinion, either where the fleece of lambs is intended to be preserved two years, or for sheep which are annually shorn. A little is clipped from the surface of the fleece of the animal ; say one or two lines in length. The loss of wool, in a middling sheep, occasioned by this operation, is not more than half a pound ; and the growth being thereby accelerated, we may expect to have a heavier fleece at sheering time. We know by experience, that in order to make our own hair grow vigorously, it requires occasional cutting.

" It was at first imagined that the Merino breed was not capable of producing, in France, wool of as fine a quality as they do in Spain, on account of the climate being colder ; it has also been said, that the superior quality of the wool is owing to the journies these animals are made to take ; and, consequently, that as we cannot manage them in the same way, we shall never be able to have it of equal fineness.

" All these reasonings having been belied by experience, some have attempted to depreciate the Merinos, by maintaining that they are incapable of taking on much flesh, and that their mutton is of a very

bad quality ; in a partial view, this objection might have the appearance of some degree of plausibility ; it is, however, completely done away with, by facts. It is not to be denied, that the mutton we eat in Spain is generally lean, tough, and ill tasted ; but I have observed, in my Treatise on Spanish Sheep, that the bad quality of the mutton in that country, is owing to their sheep not being slaughtered until they are past breeding, or until they begin to drop off from old age. Those who feed for the butchers, pasture their sheep upon commons near towns, already so eaten down that the sheep can with difficulty keep themselves alive. The Spaniards have very few wethers (*moutons chatres*) in their travelling flocks, at the utmost, two out of seven ; and, besides, their rams are never castrated until they become old.

“ Such management must produce bad mutton in any breed of sheep. Besides, the coarse wooled sheep in Spain are not better mutton than the Merinos ; and I myself have eaten, in this country, Merino mutton as delicious as our own. What I have advanced is confirmed by facts, ascertained by Citizens Tessier and Hazard, which we shall give as stated in their report to the Institute, in the year eight.

“ The experiments we had formerly made in feeding of Spanish sheep, have not been fully detailed. It has been undeniably proved, that all those animals were fattened, and their flesh was at least as delicate as that of any other breed of sheep.”

Among the stock exhibited by lord Somerville, in the year 1802, was a Merino ram, reduced almost to a skeleton, by a tedious voyage from Spain, in boisterous weather, which had since served more than one hundred ewes, and was taken from the flock the day he was sent from Bath. We believe this circumstance could hardly be known, and that it was

probably the first time a ram was ever exhibited for public inspection at that time of the year, after serving any number, much less such a flock as one hundred ewes, running with them all at the same time; more particularly when we include the sea voyage, which constantly produces fever, until sheep are seasoned to it, and always renders their importation a matter of exceeding difficulty; yet, under all these disadvantages, there was a natural tendency in him to lay on flesh and fat, which could not be controlled, together with a breadth of chest, a fulness in the twist, or leg of mutton, and a breadth on the back, exemplifying the symmetry to which these sheep, by attention to the frame, may be brought; he cleft two inches thick of fat on the rump.

This subject has, at length, excited a more than common interest, and numberless questions are asked as to the return, or profit, *per* acre, on clothing or fine wool; this will depend on the nature of the keep; if sheep are to run on pasture land only, during the whole year, so much will depend on the nature of the seasons, that no fixed value, or specific rate of stock can well be given. If a large portion of this grass is to be kept hained up for winter, and the season be not favourable, autumn rains, followed quickly by frost, will kill very much of the foggage, and the sheep will consequently be very hard driven for food from candelmas to the next shoot of grass, however late that may be. The quantity, indeed, of stock to be carried *per* acre, as well as their health and good condition, must be in proportion as there is more or less produce; and on the competent and regular supply of food, the growth of good wool wholly depends. To elucidate this subject, I cannot do better than give Dr. Parry's general statement of my claim for the Bath Society's premium, offered "for a change of breed of sheep, with positive profit

resulting therefrom," and his conclusions thereon, which is, on all hands, acknowledged to be one of the most able sketches ever given to the public.

"About the year 1800, lord Somerville's stock (as stated by him in his Memorial to the Society) consisted of forty-five ewes of the long-wooled sort. Finding these annually degenerating, and also becoming annually less profitable, he changed them, at the above mentioned period, for one hundred and fifty Ryeland ewes. In the first year, though the winter was severe, the ewes supported themselves tolerably well, and the lambs were in very good order at weaning time. In their future growth, as weathers and store ewes, they far exceeded in weight their parent stock. One lot of the weathers sold as high as three pounds each, and were fed upon grass and hay only. In the following year, lord Somerville brought from Spain some rams and ewes of the Merino breed. These rams, in each subsequent year, have been, and now continue to be put to ewes of the South Down and Ryeland breeds; from each of which crosses a valuable species of sheep has been obtained, both in fleece and carcass, the relative value of which has been detailed by his Lordship, the substance of which is, that South Down store ewes, at three pounds *per* fleece, and at 1*s.* 10*d.* *per* pound, will pay 5*s.* 6*d.* *per* fleece; which at 6 1-2 *per* acre, in good upland pasture, for seven months, and five months in turnips, at 14 or 15 *per* acre, will pay 38*s.* or 40*s.* *per* acre. Ryeland store ewes, two pounds and a quarter *per* fleece, at 2*s.* 2*d.* *per* pound, untrinded, nine sheep *per* acre, and turnips as above, will pay 2*l.* 3*s.* 10 1-2*d.* *per* acre.

"South Down and Merino ewes, of the half breed, at four pounds *per* fleece, clean washed, and 3*s.* *per* pound, will amount to 12*s.* *per* fleece; which, at 7 1-2 *per* acre, for seven months, amount to 4*l.*

10s. *per* acre for the pasture land, with turnips as above for winter keep. Ryeland and Merino ewes, of the half blood, at 10 *per* acre, for seven months, and turnips as above, at 3 1-4 pounds *per* fleece, and 3s. 2d. *per* pound, amounts to 6l. 10s. 5d. *per* acre.

“ The pure Merino fleeces never sold at less than one guinea each ; the average weight of which has been more than six pounds each, in the yolk ; and on the above allowance of pasture for seven months, and turnips as above, in aid of that pasture, the return will amount to ten guineas *per* acre.”



ON PEACH TREES.

By Joseph Cooper of New Jersey.

IN looking over a recent Almanack I observed a piece giving information, that peach trees had been preserved in the neighbourhood of Philadelphia, by removing the earth from the roots, after the first hard frost, in the fall, and returning it again in the spring, and oiling the body three or four feet from the ground, with common lamp oil.

The author likewise observes, that peach trees that stand in hedge rows and thickets, thrive better than others in cleared ground, which had suggested the idea, of defending the body of the tree, by wisps of straw, to prevent the attack of insects.

I take the liberty to make some observations on the piece alluded to.

In the first place, I think the taking the earth from the roots of peach trees, in the fall, dangerous, as I tried that method in the fall of 1779 ; the succeeding winter proved very severe, as to frost, and but

little snow; the consequence was, the loss of every tree so treated, and their worms not injured. On examining the trees in the spring, I found worms abundant as usual, and the effect the removing the earth had on them, was, causing them to injure the tree more, by descending the roots, as the cold came on; they returned to the surface as the weather warmed, and in picking them out, I found the bark dead, up to the place above whence the earth had been removed, as if a fire had been made round the tree, and the top as fresh as usual; it however died, with the approach of warm weather. The observation, that peach trees flourish in hedge rows, &c. I know is accurate; they also flourish in most places where the body is shaded; this I attribute to their being preserved from the effects of the sudden transitions, from heat to cold, and from cold to heat, which I apprehend are more destructive to peach and cherry trees, than insects, as I have had hundreds of fine trees to perish in one summer, after an irregular winter, without being in the least injured by worms.

Among many reasons for the opinion, that irregular winters are destructive to peach trees, one is, that from good authority, said trees live in Cape May county in this state, to the age of 30 or 40 years; an age, which I attribute to situation, the county being half surrounded by the waters of the Atlantic ocean, and Delaware bay; and in the direction of the winds, that cause the warm spells here in winter, and which have not the same effect there, coming as they do, so immediately off those large waters; a proof of this is, that vegetation is generally two weeks later there than here, though so far to the southward.

From many observations and experiments, I have found that the worm most destructive to peach trees,

Begins to change to a *chrysalis* about the first of July, and remains in that state about two weeks, when they come out a wasp, and proceed to couple and lay their eggs near the roots of the trees, or in wounds in any other part ; but do little injury, except in or near the roots, as, if attended to, the issuing of the gum will shew their seat, and they are easily picked out ; but their principal object is the root, the bark being softer there than on the body, and the rapid growth of the trunk near the root, at the time of the wasps depositing their eggs, causes a number of small rents in the bark, which give the worms an easy entrance. I have observed that trees in a declining state, are more favourable to the increase of peach worms, than those of luxuriant growth, as the latter discharge so much gum from the wounds, as to cause the death of the insect, and the former will bring them into the wasp state a month sooner ; for which reason I examine the peach trees carefully every spring, and those that are in such a declining state as to render them unprofitable, I hitch a team to, and draw up by the roots, as the most certain mode to destroy all the worms they may contain.

The best method I have yet discovered, to prevent injury from the worms, is to examine the trees carefully in the spring, and take out the worms ; repeat the operation about the 1st July, and hill up the earth round the trees about eight or ten inches : in October remove the earth, examine as before, then renew the hill, which leave till the spring examination. By continuing this process annually, I am confident that not more than one of my peach trees has been killed by the worms, for twenty that have died in consequence of irregular winters : and as I have observed the fluctuating state of the weather in winter, constantly to increase for more than fifty years, I conceive it must proceed from some certain cause, which

I apprehend to be the improvement of the country, every cleared field operating, when free of snow, as a reflector of the rays of the sun. That the clearing of the country is at least in part the cause of our variable winters, is rendered in some measure probable by a fact communicated to me, viz, that in the thinly settled parts of the country, peach trees flourish as well as they did formerly in the neighbourhood of Philadelphia: therefore it seems advisable to endeavour to find out some method to defend tender fruit trees from the effects of fluctuating winters; I can think of no better method to succeed, than binding straw round the body or trunk of the trees, that part appearing to be the seat of the disease.



ON PEACH TREES.

By Richard Peters.

THE last meeting of the Society was favoured with a communication on the subject of *peach trees*, from Joseph Cooper, Esq. of New Jersey, whose experience has enabled him to add much to our stock of practical knowledge. I was desired to give some account of what had fallen under my own observation, relating to this valuable and delicious fruit. I know not any in the catalogue of our trees, more desirable, nor more subject to mortifying decay, disease, and destruction. Having cultivated it from my earliest youth, it should seem that I could give some certain and profitable mode of remedying its tendency to premature decay, and repelling the diseases to which it is invariably a victim. But I have found myself so frequently baffled in my endeavours; and have seen the fallacy of so many theories, on this subject,

that I diffidently affirm any thing respecting its culture or cure. It is therefore only in obedience to the wishes of the Society, that I express my opinions or experience.

About fifty years ago, on the farm on which I now reside, my father had a large peach orchard, which yielded abundantly. Until a general catastrophe be-fell it, plentiful crops had been for many years produced, with little attention. The trees began nearly at once to sicken, and finally perished. Whether by the wasp then undiscovered, or by some change in our climate, I know not. For 40 years past, I have observed the peach trees in my neighbourhood to be short lived. Farther south, in the western country, and, it seems in some parts of New Jersey, they are durable and productive, as they had been formerly here.*

In my youth, excellent *plumbs* grew here ; now we can obtain none, but those of inferior species. In *grapes* we were never successful ; though much more so than at present. Our *wheat* in modern times, is attacked by enemies unknown to our predecessors. Our *apple orchards* do not produce, as they did in early times. There must therefore be some change in our climate ; and new races of ver-min, not known to our ancestors. In cities and towns, *grapes* and *plumbs*, and I believe *peaches*, are in high perfection. The atmosphere in which they vegetate, possesses a character favourable to their growth ; and their position admits fewer enemies to assail them. I am aware that it is a frequent mistake, to draw general conclusions, from partial facts. My opinions are formed on experience I have gained

* I have seen them also in great perfection, in and about Lancaster, and other parts, where limestone and other calcareous substances abound. The cause I do not pretend to assign ; nor do I know the general duration of the tree, in that country.

on my own property, and may not generally apply. I have near 1000 apple trees, 150 grape vines, 200 peach trees, and a number of plumbs. They are of all ages, kinds, and exposures ; and set out in every variety of soil. I have endeavoured to practise on every information to be acquired from books, or oral directions. I must therefore conclude from my frequent disappointments, that fruits in this part of the country are uncertain in product ; and have declined, in quantity and quality, in a degree not formerly experienced. I have often observed, that in bad fruit years, the seasons were unhealthy for animals. *Insects* and their *larvæ*, or catterpillars, and other enemies to fruit, abound in such seasons. The products of the earth seem to be more favoured at one period, and in different stages of the settlement of our country, than at others. Advantages or misfortunes, merely local, have their influence. Some are perfected in old settlements ; others thrive only when the earth is recently reclaimed from the wilderness of nature.

Of the *peach*, I have 32 varieties. Mr. Cox, of Burlington, has double that number. But those I have are sufficient to enable me to form a general idea. I find some less exposed than others, to misfortune and decay. It would therefore be desirable, to mark, and cultivate those most commonly, in which the most success could be counted on. Mr. Cooper has been successful, on this plan, in other products. Let him, and other curious cultivators, practise on this suggestion.

I have failed in many things, in which others are said to have succeeded. Straw and bass, or paper, surrounding the tree, from the root, at all distances, from 6 inches, to 3 or 4 feet—white washing, painting, urinous applications, brine, soot, lime, frames filled with sand, oil, tar, turpentine, sulphuric acid, or

oil of vitriol, nitrous mixtures, and almost every kind of coating. I ruined several trees, by cutting them down, and permitting the stump to throw up new shoots, and branch at pleasure. All teguments kept the exudation from evaporating with freedom. The pores being closed, or too open, were alike injurious. Teguments of straw or bass made the bark tender ; and it threw out, under the covering, sickly shoots. The more dense coating stopped the perspiration. The oil invited mice and other vermin, who ate the bark thus prepared for their repast, and killed the tree. I planted in hedge rows and near woods, I paved, raised hillocks of stone—I have suffered them to grow from the stone only, grafted on various stocks and budded, hilled up the earth in the spring, and exposed the butt in the fall, sometimes I have used the knife freely—frequently have left the tree to shoot in every direction—I have scrubbed the stocks or trunks, with hard brushes, soap suds and sand, scraped them with proper instruments : I have, for a season or two under various experiments, amused myself with the persuasion, that I had discovered an infallible *panacea*. I had temporary success, but final disappointment.

The *aphis* or vine fretter, and many other insects are hostile to this tree. They injure it, by piercing, curling, and destroying its leaves. As to *frosts*, they are common enemies to all fruit.

Having thus candidly given an account of my failures, which never discourage, but animate me to new projects, I mention what with me has been attended with the most success.

The worm or grub produced by the wasp, depositing its progeny in the soft bark, near the surface of the ground, is the most common destroyer. I remove the earth a few inches round the tree in August or September. After July the wasp ceases to

pierce the bark, and to make its deposits. I pour around the butt of the tree, beginning about one foot above the ground, a quart or more (not being nice about the quantity) of boiling hot soap suds or water. This kills the egg or worm lodged in the tender bark ; and of course prevents its ravages the next season. I carefully search the trees, though I seldom find worms. I do not perceive any injury from this operation. I have discovered worms in or near the roots of the smallest stocks taken from the nursery. These I frequently plunge into boiling water before planting. I lose very few ; and do not attribute the losses to the hot water. I have the trees bared at the roots, exposed to the winter. I have lost some in the way described by Mr. Cooper ; but I still continue the practice. I have been in the habit of doing this for ten or twelve years, and prefer it to any other treatment. To supply deficiencies, I plant young trees every year. By these means I have generally fruit enough for my family, and frequently very abundant crops. How long I shall continue to prosper by this practice, is yet problematical. I have now some of the most healthy trees I ever possessed. When trees become sickly, I grub them up ; I find that sickly trees often infect, those in vigour near them, by some morbid effluvia. The young trees supply their loss, and I have no trouble in nursing those in a state of decay ; which is commonly a hopeless task.

I have been thus particular, to justify the inference from this statement—that, in this part of the country peach trees cannot be profitably cultivated on an extensive scale. But we may have great abundance of their delicious fruit, in every variety, if every farmer and horticulturist, would plant the number, to which he could attend, without interference with his other concerns. He might keep up a constant succession,

by setting out a few every year. Our grain, and garden plants in general, require renewal annually ; and peach trees require no more trouble. A tree with very little attention, will produce three or four crops. Its growth is quick ; and it may be propagated easily, and come to perfection, in any soil of tolerable staple. As the older trees decay, or grow sickly, young and vigorous trees will begin to bear. The method which I have lately pursued is simple ; guards against the worm, and affords me a plenty of fruit. I do not mean to discourage perseverance in experiments, which may yet succeed. We must never part with hope, though she seduces and “cheats us o’er and o’er again.” The ants of Grenada were exterminated by a single tempest.

Although I have had trees 20 years old, and I know some of double that age, (owing probably to the induration of the bark rendering it impervious to the wasp, and the strength acquired when they had survived early misfortunes) yet, in general they do not live in tolerable health after bearing 4 or 5 crops. And being among the most gummy, viscous, succulent and tender of our fruit trees, they require from the earliest stages of their growth more labour and attention, than could be profitably applied to an extensive plantation. I have too many to be sufficiently attended to ; but a number of them by their present appearance, warn me not to be uneasy on that score. The shoots of the last season were remarkably injured by the excessive drought ; and the extremities of many limbs are entirely dead. I shall have, however, more than I require for myself, my friends, and my foes. I have a superfluity, to afford deductions made by plunderers, for whom (from necessity) I plant an extra number. The trees now verging to their last stage, are chiefly those set out in the locust year. They have never recov-

ered the wounds, inflicted by this most pernicious of all insects.

Fifteen or sixteen years ago, I lost one hundred and fifty peach trees in full bearing in the course of two summers ; by a disease engendered in the first season. I attribute its origin to some morbid affection in the air, which has the most to do with all vegetation, as well in its food and sustenance, as in its decay and dissolution. The disorder being generally prevalent, would, among animals have been called an epidemic. From perfect verdure, the leaves turned yellow in a few days, and the bodies blackened in spots. Those distant from the point of original infection, gradually caught the disease. I procured young trees from a distance in high health, and planted them among those the least diseased. In a few weeks they became sickly, and never recovered. I took the determination of grubbing up every peach tree, and converted them into fuel. In my own nursery, I perceived I should have a hospital of incurables. The young peach trees being generally infected, I cleared the whole of them away. Various kinds of fruit trees, in the same nursery, were not in the least disordered. Trees, like animals, have inherent diseases, or a susceptibility to receive those, peculiar to their species. The peach seems most subject to this tendency ; pears are liable to blights from the electric fluid. Iron hoops, old horse shoes, &c. hung on these trees, attract and conduct for a time, this floating fluid. But when the air is surcharged, destruction partial or total is certain. Cherries are fatally operated upon, by what is called the four o'clock sun. Plumbs too are exposed to peculiar disasters, which would lead me too far to detail ; though I have paid much and unprofitable attention to them ; and have, now and then, hit on temporary palliatives. Particular insects and

germin have their respectively favourite tree, or plant to prey on. They pursue the dictates of nature, for their own propagation and support ; while, by destroying our sustenance and comforts, they become hostile to us. They compel us to wage against them a perpetual warfare.

After my general defeat and most complete overthrow, in which the worm had no agency, I recruited my peach trees from distant nurseries ; not venturing to take any out of those in my vicinity. I have since experienced a few instances of this malady ; and have promptly, on the first symptoms appearing, removed the subjects of it, deeming their cases desperate in themselves, and tending to the otherwise inevitable destruction of others.

POSTSCRIPT.

I HAVE only recently seen, or I would have mentioned with my communication, an extensive plantation of *peach trees* (now in vigour and very productive) by Edward Heston, Esq. in my neighbourhood. It is well worthy of inspection, and its design exemplary ; the scale being larger and more spirited than of late years, we have been accustomed to see, in this part of the country. I conjecture there are 7 or 800 trees, planted in rows or lines ; so that the branches interlock, and are suffered to shoot without control. The intervals between the rows are wide, and cleaned with the plough and harrow. As is to be expected, the fruit though plentiful is small ; and wants flavour equal to that of more distant trees. They grow from the stone, and Mr. H. occupied in his plan, did not attend to the selection. He is now improving by inoculation, and providing better

kinds. In an imitation of this commendable effort, I would advise a little more distance, and more use of the knife ; but not so much as to thwart nature. I would not entirely depend on inoculation. Planting the stone is more certain, as to quick growth and earlier profit as well as economy ; though it does not insure identity of species. Mr. H. begins to suffer by the disease, I call the “ yellows ;” though he has fewer worms, than common in other modes. The wasp from which the worm proceeds, does not of choice, frequent shady places. I do not know any product more valuable than peaches, to which the same extent and quantity of ground could be applied. To ensure constant supply, another plantation should be progressing, while that in profit is bearing and declining. It should be distant from the first, to be out of reach of infection. Why should we not cultivate, in this way, this fruit, when other products are equally long before profit is obtained ? Madder, liquorice, &c. require as much time, and better ground. Their certainty or superior profit is questionable. By the mode here mentioned, constant successions may be counted upon, without the toil and disappointments of attempts, to prolong the duration of this short lived tree. I perceive Mr. H. is travelling the same road of experiment, to save declining, or insure healthy trees, I have passed over before him. He will be fortunate, if he does not meet with similar disappointments.

September, 1807.

AS I predicted, the “ yellows” are seen making destructive ravages in Mr. Heston’s peach plantation. I have lost a great proportion of my trees, by

the same malady, this year. We have had two successive rainy seasons. I do not recollect ever to have seen more general destruction among peach trees, throughout the whole of the country. It seems that excessive moisture is one, if not the primary cause of this irresistible disease.



ABSTRACT OF DR. DARWIN'S DISSERTATION ON
THE DISEASES OF PLANTS,

Taken from his work entitled, "Phytologia, or the Philosophy of Agriculture and Gardening."

THE diseases of plants he classes under three general heads, those which arise from internal causes, those from external elements, and those from the depredations and injuries caused by insects and larger animals.

Many of the diseases of plants he attributes to their irritability. From this cause he contends, it is, that plants will not bear sudden transitions from heat to cold, or even from cold to heat. Heat, he supposes, acts as a stimulus to the plant, and if too suddenly checked the plant is either injured or destroyed. Hence the gardeners in northern climates deem it as necessary to shelter tender plants, such as the flowers of apricots, as well from the meridian sun as from the coldness of the night.

He classes the internal diseases of plants as follows. 1. *Mildew*—this disease arises from a plant of the fungus kind which penetrates with its roots the vessels of the vegetable to which it adheres. The remote cause he supposes to be some previous injury the plant had received from internal disease.

The remedy recommended is to thin the crop and to admit a freer circulation of air. When it is owing, which frequently is, to the dampness of the soil, the remedy must be to chain the land and use the drier kinds of manure as ashes, &c. He further recommends sowing such land earlier in the season, as he observes mildew is more apt to prevail in the latter part of the season.

This last is a very just remark; every one must have observed how very generally, if not universally the pea is subjected to mildew in the autumn, a circumstance which seldom happens in spring. 2dly. Rust, which he describes as a ferruginous powder sprinkled under the leaves. He supposes this also to be a vegetable production of the fungus kind, and as it is probably owing to the same causes, he recommends the same remedy of increasing the light and circulation of air by thinning the plants among which it appears. 3. Clavus, ergot, or Speer. This is said to be an affection of the seeds when they become enlarged, and grow out of their natural size, pushing out horns of a blackish colour. The rye is very apt to be affected by it in France. He supposes it to be occasioned by wounds made by insects. Duhamel ascribes it to this cause. By the use of such diseased grain by the poor, diseases have been produced of an alarming nature. Quere, Is not the malady with which our Indian corn is affected, referrible to this class of complaints? It is an enlargement of the seed vessel and frequently of the seed though it not unfrequently appears in other parts of the plant. May not that also be occasioned by insects?

Dr. Darwin suggests no remedy for this complaint. 4th. Ustilago, or Smeet, when instead of seed, the fruit produces a black meal, as occurs often in wheat, barley, &c.

The doctor mentions, the usual practice of steeping the wheat in salt: in lime water and various oth-

er preparations which is supposed to be a preventive to the disease. He however quotes the opinion of other respectable persons, that this is an ancient error, and that the only use of the steeping is to separate the light wheat from the heavy. The same author cited by the Doctor suggests that the smect only takes place when wet weather occurs at the time of the wheat's being in flower, and asks whether it is not probably owing to the facina's being destroyed by the rain, and the consequent failure of impregnation of the embryo seed. Dr. Darwin evidently leans to this opinion. Upon this idea he suggests the sowing the wheat in rows considerably distant, and after a few days sowing intermediate rows, so that if wet weather should destroy the anthus of one set of rows, the alternate ones might supply the facina to their stigmas when the weather becomes favourable.

Quere, Would the stigmas of those plants which had done blowing be in a condition to receive any benefit from the facina of those which should blow some days after? We confess that we doubt it, still in places very subject to the smect, it might be well to try this experiment.

5. Canker, or gangrena vegetabilis, is what the Doctor calls an ulcer of the bark, and is very destructive to apple and pear trees.

Mr. Knight has remarked that this disease is most apt to attack those fruits which have been long known and cultivated, and supposes it to be a disease of old age. It is sometimes occasioned by blows and injuries from the hoe, spade, or plough. When the bark is thus wounded, this disease frequently ensues.

When a destruction of the bark is thus produced by external violence, it may possibly be cured by the application of a piece of living bark from a less valuable tree nicely fitted to the wound and bound on.

When the bark is ulcerated by this cankerous disease, the parts affected should be nicely cut out, leav-

ing the edges of the wound smooth, so as to admit the air freely and prevent the lodgment of moisture, and the depredations of insects. Some thick white paint should then be laid upon the hard wood or laburnum which is thus exposed, which may prevent insects from touching it, and also the rains and dews from rotting it. The paint should be so spread as not to touch the edges of the bark as it might injure their growth by their poisonous quality.

6th. The honey dew, which appears in the form of small sweet drops on the upper surface of the leaves, is supposed by Dr. Darwin to be a diseased exsudation or perspiration of the plant, but by others is asserted to be the excrement of one species of insect of the aphid kind. Dr. Darwin doubts this latter opinion because this aphid, is often found on other trees and at other seasons, without exhibiting this phenomenon of the honey dew.

The honey dew, is observed to prevail most in hot, dry weather, and sometimes produces the death of the leaf, at other times it is followed by a black powder like soot, which covers the surface of every leaf. He suggests no remedy for this complaint.

7. Sap flow, this occurs when the alburnum or sapwood of trees is wounded in the vernal months, as in the birch and maple and also in the vine, branches of which not unfrequently bleed to death. Another sap flow is said to exist about midsummer when the young buds are forming. Wounds at this season are therefore injurious. When the loss of sapjuice threatens the injury of the plant, various remedies have been applied by gardeners. Dr. Darwin thinks, that a piece of sponge bound close upon the wound would be the most certain application, or a wire twisted round the end of the branch cut off, so tightly as to stop the circulation of juices and to destroy that part which is above the ligature.

8th. *Secretio gummosa*, gum secretion, a morbid production of gum which issues from trees either from internal disease or from wounds. When this happens to cherry trees a gum exsudes like gum arabic, which in dry weather hardens, and thus prevents the further discharge of this nutritive matrical, otherwise the tree weeps away its life from deficient nourishment. This should be prevented from continuing to flow by binding on the part previously made smooth by a knife a metallic plate, such as the lead in which tea is wrapped, so as to prevent rain, or dew drops from dissolving the hardened gum. A bit of sponge or soft leather, or India rubber might be bound on under the lead till the wound is healed. Might not a strong solution of green vitriol in water or some ink, if applied to these bleeding vessels, stimulate them into contraction and prevent the further effusion of gum?

Diseases arising from insects.

1. Among the diseases of plants produced by insects may be reckoned those occasioned by the nests of insects in which they deposit their eggs. These are the galls of oak trees, of ground ivy, trembling poplar, willow, and hawkweed, &c.

2. The curling of the leaves of the nectarine peach and cherry trees, with the cells or bladders on their surfaces are formed in consequence of the wounds inflicted by the aphids. Though from the sudden and general appearance of these injuries they have been attributed to blights from inclement weather.

Some observers have believed that these affected leaves were previously out of health which made them a proper situation for the insects which affect them, and Dr. Darwin remarks that he has often observed that snails and slugs eat those leaves which

have been plucked and are beginning to wither, in preference to those which are growing in perfect health.

The history of this insect, the aphid, which is one of the most generally destructive insects with which the delicate fruit trees are infested, is extremely curious and its multiplication uncommonly rapid. It is produced in the spring from eggs which are said to be attached to the twigs of trees in the autumn, and are thought to produce not a larva or caterpillar but a progeny similar to the parent; every one of which produces in about ten days not an egg but another living progeny, and so on to the ninth generation, the ninth generation produces males and females, some of both kinds with wings and others without them, and this tenth generation from those which were hatched from eggs, become connected and produce eggs, which are laid on the new twigs of various trees for the next year's progeny to be hatched by the vernal sun.

Their punctures of the leaves of peach and nectarine trees in the vernal months and of cherry, plum, and current trees in the summer, produce a swelling and elevation of the cuticle of the leaf on its upper side, and a consequent curling of it with its upper surface outwards which terminates in a destruction of it to the great injury of the tree, and frequently to the death of it.

There appears to be a power impressed on organized bodies by the great Author of all things, by which they not only increase in size and strength, and occasionally cure their diseases and repair accidental injuries, but also a power of producing armour to prevent those more violent injuries which would otherwise destroy them. Of this last kind are the poisonous juices of some plants, as *atropa bella douna*, deadly night shade, &c. Other plants

are armed with thorns and prickles to defend them from animals, as the hawthorn, gooseberry, rose bushes, and others. Other plants secrete a thick, clammy, viscid juice, to catch the insects which may attempt to prey upon them, as the catchfly, and others. And there are other plants which, by the contraction of their leaves, arrest or destroy the insects which attack them, as the *dionora muscipula*, &c.

The means of destroying an insect, so extensively injurious as the aphis, would be indeed a valuable discovery.

If the eggs exist on the young buds, some application to these before they are hatched which might dissolve their shell (as diluted marine acid) might destroy them ; or by some adhesive material which might entangle them before they begin to move about the tree, such for example as soap suds, or oil, or glue, rubbed on the young twigs by means of a sponge or painter's brush ; but experiments alone can decide the effect of these applications, both upon the insects and upon the trees.

Lime water alone will not readily destroy the aphis, as I observed by immersing leaves with aphis on them, which crept up the leaves, and thus escaped ; but if potash or fixed alkali be mixed with lime, the solution becomes so caustic as to destroy many insects without injuring the foliage of the trees or the stems of wheat, if we may credit Mr. Socoloff, who, in the transactions of an academy at Petersburg, vol. v. asserts " That he added three parts of quick lime newly made to two parts of a saturated solution of fixed alkali in water, which, poured upon the ground, destroyed earth worms, and, sprinkled on the leaves of trees, destroyed caterpillars, but did not injure, or much injure the foliage of trees or leaves of wheat. Tar water has been lately said to destroy slugs, and might be worth a trial, by

injecting on the trees with caution lest it should injure them.

The essential oils are all deleterious to certain insects, and hence certain plants are furnished with them as a protection against insects. One of these essential oils, turpentine, is recommended by Mons. De Thosse, for the purpose of destroying insects, both upon vegetables and animals. He destroyed a vast number of insects upon his trees by a mixture of earth and oil of turpentine, which he beat together till they became of the consistence of soap ; with this mixture he moistened the ends of the branches, and both the insects and their eggs were destroyed, and other insects kept aloof by the scent of the turpentine.

Dr. Darwin's own experiment with turpentine on a nectarine tree, proved fatal to the tree as well as the insects, at least to the branches which he covered with it. A diluted solution of arsenic produced the same effect on both tree and insects.

He suggests the idea of smearing the wall against which trees are placed with this oil of turpentine, believing it is the *flavour of it* which keeps insects at a distance ; and with the same view he recommends hanging twigs smeared with oil of turpentine on quince trees and apple trees while in blossom, to keep off the insects.

It is probable, that if strong infusions were made of the leaves of certain trees which no insects ever touch, as of the walnut, laurel, fox glove, tobacco, and many others, and were sprinkled on the leaves or on the buds before they open, by a pump, or brush, or sponge, the insects might be destroyed without injury to the trees.

The dust of tobacco, if made very fine, or the powder of sulphur, forcibly injected on the leaves infected with insects, might be fatal to them. Dr.

Darwin, however, made an unsuccessful experiment with tar and tar water, lime and potash, and soap suds and lime, as well as soap suds alone. These he applied to the trees with a brush thrice on different days, before the flowers appeared, but they became as *much* affected with the aphid as on former years. He also dipped some branches covered with the insects in a strong infusion of tobacco, and held them immersed some minutes without destroying them. He did however destroy great numbers of aphides by the smoke of tobacco. (This indeed is well known to every gardener who has the care of a green house, the experiment never failing if repeated several times.) Scotch snuff, or tobacco very finely powdered, he found instantly fatal when scattered on the insects.

He suggests the collection of walnut leaves in the autumn, and making a smoke with them in the spring under the trees, usually affected with insects.

He speaks of the common caterpillar, but does not intimate any new method of destroying them, unless it be to collect the leaves under the trees in autumn, and to burn them, believing that some of the eggs are deposited on the leaves, as well as on the twigs of the tree. (This, however, wants confirmation; it is improbable that any insect should be so defective in its instinct; it is absolutely necessary to the young caterpillar that he should be placed, at his coming out of the egg, in a situation where he can immediately and easily procure food. The caterpillar is extremely tender at that period, and seldom ventures for the first week far from his home.)

The white slug, or snail, is often destructive to turnips and other green crops, coming out before sunrise in dewy mornings, and eating them off. Dr. Darwin mentions rolling the turnips with a heavy roller, which kills the insect without hurting

the turnips. (This could not be applied to cabbages, to which they are much more fatal.) He also mentions having heard tar water recommended for the same purpose, or surrounding the plants with a circle of lime or salt. Some gardeners lay boards between the rows, under which the slugs conceal themselves when the sun rises, and are by that means easily caught and destroyed.

The leaves of the young turnip are believed also to be destroyed by a fly, which, if it be of the beetle kind, may also be killed by rolling. The Chinese are said, by Sir George Staunton, to steep all their seeds in liquid manure until their germination begins to appear, which they believe not only hastens the growth of the plant, but defends them against insects in the soil ; and Sir George supposes it may be owing to this that the Chinese turnips escape the fly, so injurious to them in England.

An observation of Mr. Guillet, in the Bath Agriculture, Vol. II. Art. 44, seems to confirm this idea. He asserts, that when turnip seed is sown during a rain, or has rain immediately afterwards, that the first leaves are so vigorous that the fly never attacks them, or that the rain is so inconvenient to the fly as to prevent its appearance. When a severe frost occurs before the ground is covered with snow, those insects, which do not penetrate deeply into the earth, are destroyed. (Might it not be useful in our climate where we usually have very severe frosts before snow, to turn up the ground as late as possible, in order to expose these destructive enemies to vegetation, to the full operation of the frost ?)

The same author.

I. TO PRODUCE FRUIT-BEARING TREES.

1. There are four methods of procuring fruit-trees for the purposes of horticulture, by seeds, by root-suckers, by planted scions, or by ingrafted scions.

1. *Of Seedling Trees.*

Tulips and hyacinths, and even in potatoes and onions, the bulbs succeed each other for two or three years or longer, before they produce flowers; and that the same happens to the buds of seedling trees, which are many years a succession of leaf-buds only, before the propagation of a single flower-bud; for the power, which produces the lateral germination of buds, seems to require a less mature organization than that, which is employed in the sexual generation of seeds; whence a kind of puberty of the plant seems to be acquired for the production of the seminal or amatorial progeny, analogous to the transformation of caterpillars into butterflies; which appears to be effected solely for the purpose of propagation.

M. Speechly, in his treatise on the culture of the Vine, p. 49, seems to say, that seedling vines must be three or four years old, before they produce fruit; whereas a planted scion, or an ingrafted one, from an aged tree, will produce fruit the first or second year; and according to the observations of Mr. Knight, seedling apple-trees will not bear fruit till they are twelve or fourteen years old; and other fruit trees in similar manner require some years after their birth from the seed, before they arrive at sufficient maturity to bear flowers. Hence he advises the horticultor to procure scions for grafting from such trees as already bear fruit; but pays no regard to the stock, into which they are to be inserted; and adds, that

he believes, if scions from a bearing walnut or mulberry tree were ingrafted on a seedling one, that it would produce fruit in two or three years; which otherwise would not occur in less than twenty. *Treatise on Apple and Pear.* Longman, London. And hence we see the advantage of ingrafting on seedling orange or lemon-trees in our green-houses the scions taken from those, which bear fruit; as otherwise they would continue so many years before the buds would acquire sufficient maturity to generate flowers.

Some have believed that young trees will bear fruit sooner, if they are not pruned, but permitted to grow quite wild in large bushes. It is possible, that this may occur either from the unskilful horticultor pruning off all the terminal twigs, whose buds were forwarder in respect to age, than the lateral ones much beneath them. Or because the great number of new leaf-buds, proceeding from an exuberant branching head, may so crowd the bark of the trunk with their caudexes, that some of them may sooner find a difficulty in forming their embryo caudexes, and may in consequence become flower-buds. But I much doubt, that this can frequently occur from either cause, as I think, I have seen espaliers bear some years sooner than standards, which were ingrafted at the same time, and from the same trees. And I have been informed of other seedling apple-trees, which have borne fruit in not much more than half the time above mentioned by Mr. Knight.

It is much to be wished, that proper experiments were made on seedling trees, by planting them as espaliers, or against walls, and bending down their branches below the horizon, since the difficulty of their generating leaf-buds might be thus increased; as they could not so easily form their embryo caudexes on the compressed bark of the bended branch; and the sap-juice for the nourishment of fruit-buds

would be thus rather increased than diminished, according to an experiment of Dr. Walker, who found the buds at the extremities of bended branches to swell sooner in the season, and to become larger, than those of an equal height on the more upright branches.

Mr. Bradley has mentioned an apple, which was sweet and boiled soft on one side, and sour and boiled hard on the other; and ascribed it probably to the real cause with much ingenuity in the year 1721, long before the publication of the system of Linneus. He ascribes it to the male ferina of some neighboring harsh apple-tree, affecting, at the time of the impregnation, the stigma of the flower of a sweet one; and thus a production of different seeds might be generated in the same pericarp, and a consequent different kind of nutriment prepared for each; and thus the different parts of the apple become sour or sweet, which is analagous to a bitch producing different kinds of puppies at the same birth, resembling the different dogs with which she had cohabited. The same circumstance is said to have occurred in oranges and in grapes of different kinds.

By this method of applying the ferina of one good variety of fruit, as of apple or pear, to the stigma of another good variety, it is very probable, that some very excellent new varieties of fruit might be produced from the seeds, which might supply for a century the orchards of the curious.

The following observations are from Mr. Knight's Treatise on Apple and Pear. "Every seed, though taken from the same apple, furnishes a new and distinct variety; and some of these will grow with more luxuriance than others; and the fruits produced by the different plants will possess different degrees of merit; but an estimate may be made of their good and bad qualities, at the conclusion of the first sum-

mer by the resemblance the leaves bear to the highly cultivated, or to the wild kinds ; as has been remarked by the writers on this subject of the last century. The plants, whose buds in the annual wood are full and prominent, are usually more productive than those whose buds are small and shrunk into the bark ; but their future produce will depend much on the power the blossoms possess of bearing cold ; and this power varies in the different varieties, and can only be known from experience. Those, which produce their leaves and blossoms rather early in the spring, are generally to be preferred ; for though they are more exposed to injury from frost, they less frequently suffer from the attacks of insects, the more common cause of failure.

“ The leaves of young seedling plants annually change, become more thick and fleshy, and assume more the character of the cultivated kinds. These external changes indicate some internal ones in the constitution of the plant, which may possibly be similar in their nature to those, which take place in animals between their infancy and the time, when they become capable of propagating their species.

2. *Of Root-Scions.*

Root-suckers from bearing bur-apples, or from bearing codlings, are believed to become fruitful as soon as grafts from those trees ; because they are a viviparous offspring, as well as the scions or twigs from the branches ; and are therefore not similar to the oviparous progeny, or the young trees produced from seeds. This must nevertheless in great measure depend upon the age of the sucker ; as those root-buds, which rise into suckers, are not formed or generated in the bosom of a leaf, but from a part of one of the long caudexes of a branch-bud ; and

will therefore, I suppose, require a succession of buds for some years, before they will acquire a sufficient maturity to produce a flower; as the central buds from the bosom of a leaf I suppose to be much forwarder than the lateral buds from the same caudex; as is seen in the central or flower-bulb of a tulip, and its immature lateral bulbs from the same caudex.

Root-suckers from those trees, which have been ingrafted on the roots of other trees, as the robinia on the acacia, may arise above the grafted part, which is beneath the soil; but those root-suckers, which arise from trees, which were grafted above ground, are similar to the stock, not to the fruit-bearing head; which might have been a wild pear or wild apple; and will in that case produce crab-pears, or crab-apples, with thorny stems.

When a branch of a vine, or briar, or of many other trees, is bent down, and a part of it inserted into the ground with its summit in the air, it will emit roots at the joints, and become a new tree. So the rough knobs on the bark of a bur-apple tree, I am informed, will shoot out roots, if surrounded with moist earth; and the branch may be then cut off, and successfully planted. And from almost every joint of a fig-tree, roots will protrude, if surrounded even with a woolen shred, which happens to be frequently moistened by the dews or rain; and the branch may be successfully bent down and planted in a garden pot. All these like suckers from the roots of seedling-trees, or like grafted scions, will become fertile, as soon as the tree, from which they are the offspring; whether it be a seedling-tree or not.

This circumstance does not occur exactly similar in the insertion of buds from one tree into the bark of another as those buds, which do not arise from

the bosom of a leaf, but from lower parts of the caudexes of a branch bud, as from the bark of a branch, whose summit has been cut off, are less mature, I believe, than the summit-buds, or those which arise from the bosom of a-leaf; and will therefore require some years before they can produce flowers; as is seen in those apple or pear trees, whose summits have been entirely lopped off. This is a new observation, I believe, and worth the attention of those, who inoculate the buds of one fruit tree into another.

Root-suckers may probably be liable to degenerate in respect to their vigorous growth by hereditary diseases, owing to the too great age of the original plant of that variety, like the ingrafted scions from the branches. Whence it may be necessary to procure root-suckers of raspberry plants, and of gooseberries, and even of artichokes, and strawberries, from such as have been raised from seed not too long ago, when any of these begin to degenerate.

3. *Of Planted Scions.*

The scions taken from the branches of many trees, if planted in the earth, will emit roots, and flourish in the same manner, as when they are grafted on other trees. This succeeds with great certainty, if an inverted glass be put over them for a few days to prevent their perspiring more at first, than their absorbent vessels can supply. I have been informed, that a quick-set, or hawthorn hedge, cratægus, was thus planted and became a good fence considerably sooner than from sowing the seed.

The Chinese are said by Sir G. Staunton to be unacquainted with the art of ingrafting, and to produce dwarf fruit-trees, which are brought to table loaded with fruit at their festivals, by surrounding a branch of a bearing fruit-tree at its bifurcation with a bag of earth

which is kept moist for some months ; till the branch puts out roots, probably from the lips of a wound in the bark, and is at length separated, and transplanted into a pot. And it is then rendered a dwarf by repeatedly cutting out the central buds.

Vines possess so vigorous a power of vegetation, that the present most approved method of propagating them in grape-houses consists in planting their scions. The late Rev. John Michel of Thornhill, in Yorkshire, the philosopher, who discovered to the world the art of making artificial magnets, which had been concealed by Mr. Knight ; whose friendship I long possessed, and whose loss I have long lamented ; amused himself and family at vacant hours in his hot house. The observations of a man of such accurate and universal knowledge are always worth recording ; and though his ideas on this subject have already appeared in Mr. Speechly's *Culture of the Vine*, I shall here transcribe a part of one of his letters to me dated in May, 1785.

“The way in which we raise our vines we account our own ; for I do not know, that it was practised by any body before we set the example. It is now pretty generally adopted however by the gardeners and nurserymen in this part of the world. Instead of leaving three or four eyes on the cuttings, as used formerly to be done, which made them awkward, straggling things, we never plant more than a single eye to each, cutting them with as long a part below the eye as they can admit, without encroaching too much upon the next eye below ; that is to say, we leave perhaps about half an inch, or a little more, as it may happen, above it. These cuttings we plant by half a dozen or a dozen together, at the distance of three, four, or five inches in the bark-bed, where it is pretty warm, but not so hot as to endanger the burning of the roots, when they shall come out ; and

where it is also pretty moist, or else we water them. We plant them sloping so as to make an angle of about thirty degrees perhaps, a little more or less, with the horizon, the eye being highest ; but taking care that it also shall be covered about an inch with the bark, which is a very necessary precaution ; for though it ought just to *smell* the fresh air, it must be kept moist, to prevent the bud and shoot when it comes, from dying ; otherwise it will very frequently die away presently after it has shot a little, or at best it will grow unkindly, not having yet made roots sufficient to supply it with the sap necessary for its support ; which will not be the case, if the bud is sufficiently covered at first, and till it has acquired more roots.

“ We generally plant our vines in this way, about the beginning or middle of January ; and if the bark is pretty warm, and as moist as it should be, the cuttings will begin to push both at top and bottom in about a fortnight or three weeks at the most. When the vines have shot a little, perhaps three or four inches, but before the roots are got too long, (in which case it would be impossible to avoid breaking them by removing, on account of their extreme tenderness and brittleness) we displace a good deal of the bark very near them, till we can throw them down altogether, which shakes the bark very gently from their roots ; so that one may disengage them sufficiently easy, and without much hurting them. We then plant three or four of the most promising and thriving ones out of the whole number singly in small pots in earth, which has previously stood in the hot-house a day or two to get warm, letting the roots drop down on a little earth at the bottom, at first, as they conveniently can, and then covering them with more earth carefully, till the pot is properly filled, and the stem about three or four inches long, as I

said before, standing in the middle ; and then plentifully watering the earth to settle it to the roots. We now plunge them again in the bark, where in five or six weeks, more or less, they will have filled their pots pretty well with roots ; when they will begin to shew by their little progress, and the smallness of the shoots, that they want more room. We then take them carefully out of these small pots, disturbing the ball of earth as little as possible, and put it all together into larger pots, putting a little fresh earth at bottom and round about, and watering well as before ; and we then again plunge them into the bark.

“ By about the latter end of May, or beginning of June, the best of them will be four or five, or perhaps six feet high, and ought now to be removed, disturbing the roots as little as possible, into the natural ground, where they are to remain. If this is done carefully, and the earth well watered about them to settle it to their roots, they will frequently begin growing again almost immediately, but at least in three or four days ; and will then often shoot in the hot-house two inches in a day, and by the end of the year will have shot from eighteen or nineteen, to three, four, or five and twenty feet. Though we approve of this as rather the best, yet if these cuttings are planted in the same way either singly in small pots, or two or three together in each, with earth, instead of planting them in the bark, destroying all but the best one, when they have shot a little, and plunging them either in the bark, or in default of a bark-bed, in a common hot-bed, they will do equally, or nearly equally well ; only taking care, that the hot-bed is not too hot, so as to injure the roots, of which there is sometimes danger.”

4. *Of Ingrafted Scions.*

The art of ingrafting trees is of great antiquity, and is attended with numerous well known advantages, but is not yet arrived to its utmost perfection ; for it is not yet certainly known, whether the ingrafted scion gives or takes any property to or from the tree, which receives it, except that it acquires nourishment from it.

There is one instance recorded by Bradley, where the scion of a variegated jassamine gave variegation to the leaves beneath it of the unvariegated jassamine, on which it was ingrafted, though the graft itself perished. This seems to shew that a communication of juices exists between the graft and the stock ; and that thus some change in the colour of the leaves of the stock might be occasioned by the inosculation of the vessels of the new bud with those of other buds in its vicinity. Thus if a scion of a purple grape was ingrafted on a white one, the leaves of the latter might probably become somewhat red in the autumn, like those of the purple-vine ; but there are no instances recorded, where this communication of juices from the graft to the stock, or from the stock to the graft, has varied the flavour or the form of the flowers, or fruit of either of them.

For though the same vegetable blood passes along both the upper and lower part of the caudex of the new scion, which extends from its summit on the branch to its base in the earth ; yet the molecules secreted from this blood are selected or formed by the different glands of the part of the caudex, which was brought with the ingrafted scion, and of the part of it which remained on the stock, in the same manner as different kinds of secretions are produced from the same blood in animal bodies.

Some have nevertheless believed, that scions, ingrafted on more vigorous trees of the same genus, have acquired greater vigour in the growth both of their leaf-buds and fruit-buds. Mr. Speechly asserts, that he has improved many kinds of vines by ingrafting those, which bear small grapes, and which have generally weak wood, on stronger ones, which he has often experienced ; and recommends the Syrian vine to graft upon, and prefers those, which were raised from seed for this purpose ; and the contrary seems to appear, where more vigorous scions have been ingrafted on less vigorous stocks ; as apple-scions on crab-stocks ; where in a very few years the part above the grafted joint becomes much larger in diameter than that below it.

Grafted scions succeed well in general on trees of the same genus, as in the common engraftment of fruit-trees ; so the laurel, *prunus lauro-cerasus*, will grow on the common cherry, *prunus ceracus*, and produce a tall evergreen tree. But there are said to be instances also of success in the ingraftment of trees not only of different genera, but even of different orders and classes ; as I have been informed, that apple-scions, *pyrus malus*, have grown, when ingrafted on hazles, *corylus*. And one of the fathers of the Carthusian order is said to have succeeded in grafting a vine, *vitis*, on a fig-tree, *figus* ; and a jasmine on an orange. Travels in France and Italy, by E. Wright. It is hence probable, that many new discoveries might be made by more frequent experiments on this subject.

It nevertheless appears that in grafted trees, though the stock annually become covered with a new bark, as well as the graft, yet it does not change its nature ; since any new buds, which come out from the stock afterwards, are similar to the stock, not to the graft ; and in many trees the graft grows so much faster as to

become nearly of double the diameter of the stock, as frequently seen in old cherry-trees.

Thus the buds of fruit-trees, like the bulbs of tulips, when raised from seed, annually improve in their colour, length, thickness, and often in the shape of their leaves, for a certain number of years; and then acquire a male, or a female, organ of reproduction, as in the classes of monœcia, and diœcia; or both, as in hermaphrodite flowers. After this period the central buds and bulbs annually produced are in every respect similar to their parents, except in the nearer progress to old age of the tree, or of the bulb-progeny; and the consequent tendency to hereditary diseases. But the lateral buds from the lower parts of the caudex of the central ones, which are not generated in the bosoms of leaves, are of a more immature kind, and in that respect do not resemble the central bud, or bulb; but require some years before they flower.

Mr. Knight has observed, that the grafts from those fruit-trees, which have been in public estimation for a century or two, are now so liable to canker, that they bear very little fruit, and are not worth cultivation; which he ascribes to the age of the tree; as a graft he says is simply an elongation of the parent tree. And as it demands some years to acquire the puberty necessary for sexual generation, so it may become weak and irritable by age, and perish about the same time with the original tree; which is somewhat countenanced by another remark of Mr. Knight, that the summits, or long extremities of old trees, frequently die many years before some smaller branches from the trunk, which continue to flourish, as is frequently seen in old oaks as well as in fruit-trees; and which he might suppose to be occasioned by the greater age of the terminal buds than of the lateral ones, as well as from the greater length of their absorbent vessels, and the consequent greater resist-

ance to the ascent of the sap-juice, which may also be sooner impeded, or totally stopped by the inirritability of old age.

Nevertheless as the buds of trees are successive progenies, and cannot therefore be liable to old age, as they die annually ; the degeneracy of the buds of very old trees, or of those which have long succeeded each other by their lateral, and not by sexual generation, must arise from their being liable to hereditary diseases only, and not to hereditary improvements.

That the degeneracy of some plants is owing to hereditary diseases, and not to old age, appears from their continuing for long uncounted periods of time after the production of these diseases, as berberries without seeds, and vines without seeds, and strawberries without fruit, though probably with seeds, as the barren hautbois strawberries, which bear no fruit, so called, have perfect stamina and pistilla, as I this day observed with a good lens ; to which may be added those female figs which have no aperture to admit impregnation, and the monstrous double flowers, which have lost the power of seminal propagation, and some mule-plants which never possessed it.

There is an apple said to exist at New York in America, which is asserted to be sour on one side of it, and sweet on the other side ; and to have been produced by slitting a scion of a sour apple, and another similar one of a sweet apple, taking care to cut the buds of each scion with a very sharp knife exactly in half, and by applying them and binding them nicely together, and then ingrafting this double scion on a tree. I mention this as it is related by Mr. Jay in the communications to the Board of Agriculture, Vol. I. part 3 and 4, p. 362 ; and is referred to in the Memoirs of the American Academy, Vol. I. p. 386. But there must undoubtedly have been some mistake in

respect to the production of such an apple by any method of grafting, and which is so well explained as above by Mr. Bradley.

It only remains here to add in respect to grafting, that it is necessary to apply the bark, which contains or consists of the caudex of the young scion, exactly to the bark of the branch, into which it is inserted, or applied ; and then all species of ingrafting succeeds, whether it is performed on a branch or on a root ; and whether by excision, or inoculation, or inarching. But I suspect, that where a single bud is inoculated, it has often failed from the unskilful operator having selected a flower-bud instead of a leaf-bud ; which probably unites its caudex to those of the stock with less vigour, and certainly dies after it has ripened its seed ; or by his imprudently holding' the bud in his mouth, as he ascends the ladder, or while he makes the incision, and thus destroying it by heat, as I once observed. A leaf-bud may in general be distinguished from a flower-bud by its being sharper pointed and less spherical.

Where the summits of very young scions of only a few weeks old are to be used to ingraft with and upon, it may be necessary also to apply the pith exactly to the pith ; as this summit bud is yet a primary being, and not like a lateral one, whose whole caudex exists in the bark, which adheres to it, when it is taken off for inoculation.

The choice of buds for the purpose of inoculation is probably of more consequence than has hitherto been imagined. As we have endeavoured to shew, that buds from parts of the bark distant from the central bud, and which are not generated in the bosom of a leaf, are in different states of maturity ; they must require more years before they can produce a sexual progeny of flowers, and a consequent seminal offspring, with the reservoir of nutriment or fruit,

which attends it. A subject which is new, and merits to be further inquired into.

It is curious to observe that when harsher fruits become sweeter, that the blossom becomes whiter, as is universally seen in those of our native crabs, and of our cultivated apples ; and that the buds become larger, and the green leaves also become of a larger area, and of paler complexion.

Thus Mr. Knight observes, “ that the width and thickness of the leaves generally indicate the size of the future apple ; and the colour of the black cherry and purple grape may be known by their autumnal tints ; and that even in plants, which have sprung from seed in the preceding spring ; as the tinging matter in the leaves of these plants is probably of the same kind as that, to which the fruits will in future owe their colour.” The leaves of the purple grape become quite red in autumn, as well as those of the *geranium robertianum*, and many other kinds of foliage, which I suppose may be owing to their abundance of acid, which uniting with the blue part of what constitutes along with the yellow part the green colour of vegetable leaves, converts it to red ; as it changes the colour of blue flowers into red ones.

The following methods will contribute to prevent the young buds from so readily acquiring new caudexes on the trunk of the tree ; and will therefore retard the generation of leaf-buds, and consequently assist the generation of fruit-buds ; and should be executed about midsummer, or soon after, as at that time the new buds are formed.

1. *The first method consists in bending the viviparous branches to the horizon, which converts them into oviparous ones*, for by the curvature of such branches the bark will be compressed on the under side, and extended on the upper side of the curve, and its vessels on both sides will be contracted in their diame-

ters, and thus the difficulty of producing new caudexes for the generation of embryo leaf-buds will be increased in whatever state of miniature they may be conceived to exist.

A curious fact seems to be established by the experiments of Dr. Walker in the first volume of the *Edinburgh Transactions*, which shews that the bending of a branch even below its insertion into the trunk does not impede the ascent, or derivation of the vernal sap-juice into it ; but on the contrary, that it rather appears to assist it, resembling in some measure a capillary syphon, which may be owing to the vernal sap-juice ascending principally, or entirely, in the sap-wood, as appears by the new leaves expanding to a certain degree on decorticated oak trees. And as the vessels of this alburnum are more rigid, they may be less liable to contraction or coarctation by bending down the branch than the bark-vessels, as well as from their being placed within the latter, and therefore less liable to compression beneath the curvature, and to elongation above it.

Whence it appears, that the bending down a branch of a fruit-tree below the horizon does not diminish the nutriment of the fruit-buds, but rather increases it ; as Dr. Walker observed these buds to grow sooner and larger at the extremities of the bended branches than on other parts of equal height.

It was asserted by Mr. Lawrence, that the more the branches of any tree are carried horizontally, the more apt that tree is to bear fruit ; and that the more upright or perpendicular the branches are led, the more disposed is that tree to increase in wood ; which he ascribes to the bending down of the branches impeding the circulation of the sap. Mr. Hitt in his *Treatise on Fruit Trees*, affirms, that if a vigorous branch of a wall-tree be bent down to the horizon or beneath it, it loses its vigour, and becomes a

bearing branch ; and therefore recommends his method of nailing the branches of wall-trees, and of tying those of espaliers in an horizontal direction or still lower ; as in this constrained situation there must occur greater difficulty, I suppose, in the production of the new caudexes, necessary for the embryo progeny of buds, upwards or horizontally along the bended branch contrary to their natural habits, as well as from the compression of the bark beneath the curvature of the branch, and its extension above it ; whence more flower-shoots are produced, which do not require new caudexes to pass along the bended branch ; but which permit their progeny, the seeds, to fall upon the earth, and penetrate it with their new roots.

In Lord Stafford's gardens, at Trentham, I remember to have seen, many years ago, some standard dwarf apple-trees with all their branches bent down, and fixed on a slight frame-work about a foot from the ground ; which seemed to be uncommonly prolific, as a circle of white and purple flowers twenty feet in diameter on branches radiated from a centre, appeared to a distant eye like a lunar halo, or a carpet of rich embroidery.

The greater production of fruit-buds on branches bended to the horizon must contribute, I should suppose, to the prolific effect of training nectarine and peach-trees on tiles laid on the ground, or on the gentle declivity of a bank of earth facing the south, which has lately been recommended by some one, whose name I do not recollect, who gained a patent for his discovery. And it is indeed probable, that both these modes of training fruit-trees, one of which may be called an horizontal wall-tree, and the other an horizontal espalier, would repay the labour of the horticultor ; as they would be exposed to a more vertical sun in summer, which might more certainly ripen

their fruit; and would be kept somewhat backward in the early spring, by the greater obliquity of the sun-beams, and might be therefore less liable to injury from the vernal frost; and when in blossom might easily be covered in the night, when necessary, by mats thrown over them, supported by stakes with horizontal poles on them.

2. Secondly. *The twisting a wire, or tying a waxed string round the viviparous branches of a tree, induces them to become oviparous*, as observed by Mr. Whitmill, who bound not only the viviparous shoots of various wall-trees with strong wire, but also some of their large roots, and thus increased the product of his fruit. M. Buffon produced the same effect by a tight cord round the branches, which previously produced leaf-buds instead of flower-buds.

M. Buffon concludes from the above experiments, that an ingrafted branch bears fruit more copiously, and more certainly, from its vessels being compressed by the callus around the ingrafted junction, which may have this effect, and at the same time contribute by preventing the luxuriant growth of its leaf-shoots to render the tree of more dwarfish stature. I am informed that many dwarf apple-trees, which are now planted in garden pots both in France and England, bear much fruit, and are elegantly placed in the centre of a dessert at luxurious tables; and that the principal art of producing them consists in ingrafting them three or four times, scion on scion; so that the stem is compressed by the callus of three or four ingraftments before the branches are permitted to divaricate; and the trees are thus rendered beautiful dwarfs.

The effect of thus compressing the bark by a wire, or a cord, or by the callus round the junctures of the ingrafted scions, is undoubtedly accomplished by the increased difficulty opposed to the production of the

caudexes for each new embryo leaf-bud, as above explained, and the consequent generation of flower-buds instead of them.

3. Thirdly. *The wounding, or breaking a viviparous branch, or cutting away a ring of the bark, as of pear-trees, or a semicylinder of the bark of other fruit-trees, induces them to become oviparous.*

Where young trees discover too great vigour, Mr. Lawrence advises to cut the most vigorous shoots two parts in three through, leaving a large notch, that the wound may not heal too soon ; which he adds will both render them fruitful, make them more readily conform to the wall or espalier, and preserve such as are dwarfs from too much aspiring in very strong branches, especially of pears ; he recommends two or more such incisions to be made in the same branch.

Another method he proposes is to break the too vigorous branches half through with the hand, which he has practised with success in apricots and peaches, when the branches were formed directly forward from the wall, and these branches have continued several years to bear fruit, though some have occasionally died by effusing gum ; and though these incisions and breaking the branches may be performed at any time of the year, he prefers the spring on account of the wet or frost of winter.

A complete cylinder of the bark about an inch in height was cut off from the branch of a pear-tree against a wall in Mr. Howard's garden at Lichfield, about five years ago ; the circumcised part is now not above half the diameter of the branch above and below it, yet this branch has been full of fruit every year since, when the other branches of the tree bore only sparingly. I lately observed, that the leaves of this wounded branch were smaller and paler, and the fruit less in size, and ripened sooner than on the

other parts of the tree ; and another branch has the bark taken off not quite all round with much the same effect.

The theory of this curious vegetable fact receives great light from the foregoing account of the individuality of buds. A flower-bud dies when it has perfected its seed, like an annual plant, and hence requires no place on the bark for new caudexes to pass downwards ; but on the contrary leaf-buds, as they advance into shoots, form new buds in the axilla of every leaf ; which new buds require new caudexes to pass down the bark, and thus thicken as well as elongate the branch. Now if a cylinder of the bark be destroyed, many of these new caudexes cannot be produced ; and thence more of the buds will be converted into flower-buds.

In this curious circumstance the caudexes of the buds of the tree above the decorticated part seem to have emitted short radicles into the alburnum ; the vessels of which must thus have acted as capillary tubes between the upper and lower caudexes of those buds ; as capillary tubes will raise water by the attraction of their internal surfaces nearly to their summits, when they are not too high in proportion to their diameter ; but water will in no case flow over their summits, but will always stand with a concave surface below the uppermost rim of the tube, in which situation it may readily be absorbed by vegetable radicles ; and may be supplied from beneath by the sap-juice raised by the vegetable action of the absorbent vessels of the caudexes, whose radicles terminate in the earth.

It is customary to debark oak trees in the spring, which are intended to be felled in the ensuing autumn ; because the bark comes off easier at this season ; and the sap-wood, or alburnum, is believed to become harder, and more durable, if the tree remains

till the end of summer. The trees thus stripped of their bark put forth shoots as usual with acorns on the sixth, seventh, and eighth joints, like vines ; but in the branches I examined the joints of the debarked trees were much shorter than those of other oak-trees, the acorns were more numerous, and no new buds were produced above the joints which bore acorns. From hence it appears, that the branches of decorticated oak-trees produce fewer leaf-buds, and more flower-buds. And secondly, that the new buds of debarked oak-trees continue to obtain moisture from the alburnum after the season of the ascent of the sap in other vegetables ceases ; which in this unnatural state of the debarked tree may act as capillary tubes, like the alburnum of the small debarked cylinder of a pear-tree above mentioned ; or as the vessels of the alburnum may not yet have lost their vegetable life, they may continue to absorb sap-juice or water from their radicles, and carry it to the buds at the summits by their spiral contractions as in the bleeding season.

It is probable, that if oaks were debarked in the summer, that much fewer leaf-buds would appear amidst the flower-buds ; because many of the latter must be advanced too far, when the trees are debarked in the spring, to be converted into flower-buds by preventing the production of their caudexes, or by impeding the ascent of the nutritive sap-juice ; which in these trees is lodged principally I suppose in the alburnum. On the same account, when much sap-juice is taken in the vernal months from the birch or maples for the purposes of making wine in this country or sugar in America, I am informed, that no great difference occurs in the respective numbers of flower-buds or leaf-buds which then succeed ; but that the general luxuriance of the tree is diminished ; which evinces, that for the design of generating more flower-

buds and fewer leaf-buds by partial decortication, it should be performed about midsummer.

The cylindrical or semicylindrical decortication of a large root of a tree, as well as of a branch, is said to answer the purpose of increasing the production of fruit-buds by lessening the number of leaf-buds ; but may be subject to two inconveniencies ; first, that the wounded root being near the surface of the ground may be liable to rot like the bottoms of hedge stakes ; or like timber, which is kept in moist cellars ; or the posts of wooden bridges, which are alternately exposed to water and to air. A second inconvenience may occur from terrestrial insects having access to the alburnum of the root, which is often full of sweet sap-juice to invite them, and is otherwise generally defended by an acrid rind.

The parts of a tree immediately below a decorticated or a strangulated branch or root will generally become viviparous, and will thence be said to be increased in vigour ; that is, it will produce new leaf-buds, and those of a luxuriant appearance ; because the injury of the bark of the branch or root will prevent the parts above from receiving so much of the nutritive sap-juice, as in their sound state ; and consequently the parts beneath will possess more of it ; and also because these new buds are generated from a lower part of the caudex, and will thence be a few years before they will acquire that maturity, or puberty, which is necessary for the generation of flower-buds, or the production of a sexual or seminal progeny ; whence by strangulating or decorticating the alternate branches of a pear-tree they will bear for six or eight years ; and the other alternate ones will become in the same time strong and vigorous, ready to undergo a similar operation, when the former cease to be of further use ; but the fruit will become

smaller in size, though in greater number, and ripen earlier in the season.

In the same manner new root-scions are said to be produced by strangulating a branch of a root near the surface with a tight string, or by slitting a root near the trunk ; as in these cases the ascent of the sap-juice is impeded, and the part below becomes viviparous, or produces new leaf-buds for the reasons mentioned in the last paragraph ; as is frequently seen where the end of a branch is lopped, or beneath the scar of the junction of an ingrafted scion. On the same account it is not uncommon to ingraft with success on roots taken out of the ground, and afterwards replanted ; as the robinia on the root of acacia, and any other apples on the roots of the suckers of bur-apple, or codling.

For the same reason the roots of some plants, which are otherwise not easily propagated, will shoot up buds ; if a part of them next the stem of the plant be half cut through, or raised out of the ground, and exposed to the air ; as in pyramidal campanula, and geranium lobatum. And for the same reason the lateral branches of numerous shrubs, as well as of herbaceous plants, will put forth roots, when they are bent down into the ground, if they are previously wounded to prevent the free supply of the vegetable nutriment in its usual course, as in laying carnations, dianthus.

A method of converting the viviparous branches of pear and apple trees into oviparous branches, is described by Mr. Fitzgerald in the Philosop. Transact. Vol. lii. and seems to be superior to the exsection of a cylinder of the bark above mentioned ; as the alburnum is not left naked after the operation. In the month of August he made a circular incision round the principal branches of several pear-trees, apple-trees, plum-trees, and cherry-trees, near the stems of

each, quite through the bark. About three or four inches higher he then made another incision round the bark, and then a perpendicular one, joining these two circular ones, and separated the cylinder of bark nicely from the wood, covering it, and the bare part of the wood, from the air for about a quarter of an hour, when the wound began to bleed. He then replaced the bark with great exactness, and bound it round rather tightly with bass, so as to cover the wound entirely, and half an inch above and below the circumcisions.

In about a month the bark began to swell above and below the bandages, he then unbound them, and found the parts quite healed. He rebound them slightly with bass, and let them remain so till the beginning of the next summer, when he again took off the bandages, and found them all healthy, and every one of them bore plentifully that season, though it was in general reckoned a scarce fruit year.

He treated two young pear-trees in this manner, which never had yet had any bloom ; on one of them he operated on the main arms, and on several of the less branches from those main arms ; and on only one of the main arms of the other. The first, he says, bore a surprising quantity of fruit in the next summer ; and the circumcised arm of the other bore a moderate quantity ; though no other part of the tree had any appearance of bloom.

Mr. Fitzgerald afterwards took a cylinder of the bark from the branches of two young apple-trees about the same size, as exactly as he could by measure ; and, changing them, bound them each on the other tree. The bark of one had a leaf-bud and two apples growing on it ; the barks of both of them healed perfectly, the leaf-bud put forth leaves, and the apples remained on and ripened ; and both the

branches bore so plentifully, that one broke with its load, and it was necessary to prop the other.

The theory of the success of these curious experiments confirms that delivered above concerning the scars made by the junction of ingrafted scions with the stocks ; and it is probable, that three or four circular incisions through the bark on viviparous pear or apple-trees, or a spiral incision, might answer the purpose without detracting and replacing the bark ; as scars or callous circles would be thus produced, which might render it more difficult for the new caudexes of the embryo leaf-buds to be generated, or their parts united, and consequently increase the number of flower-buds.

Mr. Fitzgerald further observes, that he changed cylinders of the bark with equal success of nectarine and peach trees ; and that the branches thus operated upon were retarded in their general growth ; which coincides with the idea of repeatedly grafting one scion above another on the apple-trees designed for dwarfs to be set in garden-pots.

4. *The transplanting a viviparous fruit-tree, or destroying some of its roots before midsummer, or the confining its roots in a garden pot, or on a floor of bricks beneath the soil, will induce it to become oviparous.*

Mr. Knight, in his Treatise on the Culture of the Apple and Pear, p. 83, has the following passage. " In the garden culture of the apple, where the trees are retained as dwarfs or espaliers, the more vigorously growing kinds are often rendered unproductive by the excessive, though necessary, use of the pruning knife. I have always succeeded in making trees of this kind fruitful by digging them up, and replacing them with some fresh mould in the same situation. The too great luxuriance of growth is checked, and a disposition to bear is in consequence

brought on." The same observation was made by Mr. Lawrence, who took up trees which were too vigorous; that is, which produced viviparous buds instead of oviparous ones, and replanted them to render them fruitful.

In transplanting trees for any purpose it may be observed, that they should not be replanted deep in the soil, since the most nutritive or salubrious parts of the earth are those within the reach of the sun's warmth, of the descending moisture, and of the oxygen of the atmosphere. And as the root-fibres of trees, like those of seeds, always grow towards the moistest part of the soil, as the young shoots and leaves grow towards the purest air and brightest light; it follows, that the root-fibres seldom rise higher in the ground than they were originally set, and seldom elongate themselves even perfectly horizontally; so that when a fruit tree is planted too deep in the earth, it seldom grows with healthy vigor, either in respect to its leaf-buds or its flower-buds.

This curious effect cannot be produced by generally debilitating the tree from its want of due nourishment; because it is said to succeed best in very good soil, or by the addition of new garden mould, as before directed; but by rendering more difficult the production of radicles from the caudexes of the embryo leaf-buds; which descend to the finest ramifications of the old roots, and elongate themselves beyond the extremities of their ultimate fibrils; a great number of which roots being torn off by transplantation, or compressed in a garden pot, the production or progress of many of the new radicles must be impeded or prevented; and the numerous caudexes of new leaf-buds be in consequence formed with greater difficulty; whence an increased tendency to generate flower-buds.

For the same reason if beans, *vicia faba*, which are but a few inches high, be transplanted; they do not become so tall, but they flower and ripen their seeds sooner; because they cannot so easily generate new leaf-buds. The same occurs in frequently transplanting brocoli, brassica; the plant does not grow so tall, but has earlier flowers, and in greater number; and it is hence better to pluck them up, than to dig them up, for the purpose of replanting them; as by that means more of the root-fibres are torn off, and the plants become almost totally oviparous.

It is well known, that the vessels of animal bodies are less liable to bleed, when they are torn asunder, than when they are cut with a sharp instrument; as their diameters are contracted, or their internal surfaces brought into contact with each other, in the act of extending them, till they break. Thus if the navel-strings of new born animals are cut instead of torn, they are liable to bleed to death; and there is a remarkable case of a miller's servant, who had his arm and shoulder bone, or scapula, torn off in a wind-mill without much loss of blood. This is mentioned to shew, that it may also be better to tear up roots, which are transplanted for this purpose, than to dig them up; as they may thence effuse less vegetable blood, and in consequence be less weakened by the operation.

In transplanting strawberries many of the roots being torn off, fewer leaf-buds, and consequent wires, are produced from the difficulty, which their embryon caudexes find in producing new radicles over the old ones to supply nutriment to the wires, till they bend down and protrude roots into the ground at their other extremities, whence a greater number of flower-buds are generated; on this account the roots of strawberries should generally be transplanted, or new ones from the wires should be cultivated, every third

or fourth year, to prevent the too luxuriant growth of their wires; or a similar difficulty of producing wires or leaf-buds may be effected by crowding the roots of strawberries together, as some gardeners recommend; but I suppose by these means the fruit may become smaller from scarcity of nutriment, though more numerous.

A floor of bricks, or of stone, extended about two feet deep beneath the roots of wall trees, has been practised in some gardens from an idea, that the roots shot themselves too deep into some unwholesome stratum of earth; and it has been observed, that the trees became better fruit-bearers. In some situations it is possible, this might be the cause of the new prolific property of the trees; but I suspect it has occurred generally from the difficulty opposed to the number and elongation of the root fibres, and consequently to the generation of the new caudexes of the embryo leaf-buds; whence a greater production of flower-buds ensued.

In similar manner it is asserted by one of the Linnean school in the *Amœnitates Academicæ*, that some bulbous rooted plants, which seldom produce seeds in Sweden, will produce prolific seeds, if their roots be confined in a garden pot, till they crowd each other; as those of the lily of the valley, convallaria. And that the orchis will bear prolific seeds, if the new root early in the season be severed from the old one, which has put up the flower-stem. This must occur in the former case from the difficulty, which the plants find to generate new offsets at their roots, which are their viviparous progeny; and in the latter case from the new offset being destroyed; whence in both situations more nutriment is expended on the flower.

On the same account it is probable, that confining the roots of cucumbers and melons in small garden

pots would stop the too luxuriant growth of their leaf-buds, and render them sooner oviparous, if care was taken to supply them with water more frequently, and with sufficient nutriment by mixing with the water some of the carbonic black fluid, which has drained from a manure heap.

5. *If the central viviparous branches of a plant be cut away or shortened, the lateral ones will sooner or more completely become oviparous.* 1. There are many very small buds on the lower parts of large branches, which do not seem to grow to maturity, and in consequence produce neither new leaf-buds nor new flower-buds. There are other lateral shoots on many trees, which only push out a few inches, and are called spurs, and which bear fruit the succeeding summer at their extremities. In many other plants the lateral branches are oviparous, except at the extremity, which is terminated with a viviparous bud; while the central branches continue long to generate only a viviparous progeny, as in vines and melons.

The first of these, or the unprolific existence of the buds at the bottom of large branches, may be owing in part to their feebler efforts of pullulation from the want of sufficient sunshine and ventilation; and also in part, like the spurs, and other lateral branches, to the difficulty they encounter in producing the embryo caudexes of new leaf-buds along the trunk; which is already occupied by those of the more vigorous vegetation of the central branches, which possess a greater share of sunshine and ventilation.

2. What then happens in all these situations when the central parts are cut away or shortened? First the dwarf buds at the bottom of these large viviparous branches, which are in part cut away, will find more room to push down the embryo caudexes

of new leaf-buds; and will produce a viviparous progeny; and those at the bottom of oviparous branches, which are shortened by cutting off their viviparous extremities, will also now pullulate, and produce flower-buds for the succeeding year, owing to the derivation of some of that nourishment to them, which would otherwise have been expended on the summit-bud. Secondly, the spurs will generate an oviparous progeny, but will acquire more nutriment, because all the vessels of plants inosculate, and will thence produce larger fruit, and more certainly ripen it. Thirdly, the other lateral branches will receive more nourishment, and become more vertical, and will thence find less opposition to the production of the caudexes, both of their flower-buds and leaf-buds; either of which may become stronger or more numerous according to the greater or less inclination of the branches to the horizon; and both of them may be more vigorous properly speaking; that is, they may become larger leaf-buds, or larger flower-buds, than others of the same tree.

3. Thus in the management of *MELONS*, which would grow into branches much too extensive for the artificial glass-frames of our climate, and would not have time to ripen their later fruit in our short summers; it is necessary first to check the vigour, properly so speaking, of the whole plant. This is done by washing the seed from the ripe fruit, which should naturally contribute to nourish it; and by keeping the seed four or five years, that the mucilaginous nutriment deposited in the cotyledons may also be in some degree impaired; it is also probable, that confining the roots of melons and cucumbers in garden-pots, if they were well supplied with nutriment, warmth, and water, might be advantageous for this purpose.

Secondly, as soon as the leaf appears an inch in diameter, experienced gardeners pick out the central bud, which causes an oviparous, though a more vigorous, lateral shoot; which therefore sooner bears fruit, and that of a larger kind; as it acquires more nourishment from the destruction of the central one.

And as these lateral branches are liable to produce other viviparous shoots at their extremities, after they have generated lateral flower-buds, it again becomes necessary to pinch off the viviparous extremities of them, not only to accommodate them to the size of the glass-frame, but also to supply them with more nutriment, which would otherwise have been expended on the viviparous summit.

The central bud, or summit, of the lateral branches, is generally viviparous, as well as of the central branches; because the embryo caudexes of its new offspring are opposed in the production along the back by only one curvature at the insertion of the branch into the trunk; whereas the lateral buds of the lateral branches have the progress of the embryo caudexes of their new buds opposed by two curvatures, one of the bud to the branch, and another from the branch to the trunk.

There is another reason, why the lateral buds of many plants produce flowers sooner than the summit; which is, that the lateral buds of those plants, where the pith of the upright central shoot is not divided, are propagated from the central shoot, and are therefore one generation older; and have thus acquired the maturity necessary for amatorial reproduction. In other plants, where the pith of the stem is divided at every joint, the summit bud has been preceded by more generations, and is therefore more mature for the purpose of producing flowers, than the lateral ones, as in a stem of wheat; and probably in the artichoke, and on the spurs of some fruit trees, as of pears.

II. TO PERFECT AND ENLARGE THE FRUIT.

IT is believed by some of the Linnean school, that flower-buds or leaf-buds may be converted into each other in the early state of their existence. It is indeed probable, that either a flower-bud or leaf-bud may be generated instead of each other reciprocally, before either of them exists; but after either of them has obtained a certain degree of maturity, so as to be distinguished by its form being more pointed or more spherical; I suspect no addition or detraction of nutriment, or of the facility of the production of its embryo caudexes down the bark and radicles beneath can change its destination.

1. *Shorten the oviparous branches, when the leaves fall off, by pruning their viviparous summits, and cut away the root-suckers.* The summits of the lateral branches, as well as the erect ones, are furnished generally with viviparous buds; which in many wall trees should be cut off, after the leaves fall in autumn; that more nutriment may be derived to the fruit-buds, which may occasionally become somewhat enlarged during the milder days of winter; as they are now certainly too far advanced to be changed into leaf-buds; and if this pruning be deferred till late in the winter months, the flower-buds will not be quite so forward, as if it be performed earlier. For the same reason the root-suckers also should be cut away in the autumn, that all the nutriment, which they would otherwise expend, may be derived to the flower-buds, and induce them early to enlarge themselves.

3. *Thin all those fruits, which are too numerous; pluck off apricots, peaches, gooseberries; and cut out many grapes from each branch with scissars.* By the

inosculation of the vessels of vegetables when any parts of a tree are destroyed, those in their vicinity become more vigorous. On this account when part of the fruit is taken away as early as may be, the remaining part acquires more nutriment. Add to this, that, where the fruit is crowded, some of it becomes precluded from the sun and air, and in consequence does not perfectly ripen, and is liable to become mouldy; for mucor is a vegetable production, which like other fungi does not require either much light or air, as appears from the growth of some fungusses in dark cellars, and of common mushrooms beneath beds of straw.

4. *Prevent the production of new leaf-buds.*

In some pear trees the whole of the blossoms become sterile, and fall off without any apparent injury from cold, and this for many successive years. The same occurs sometimes to chesnut trees, *æsculus pavia*, after the flower the fructification entirely falls off; some of these might be male flowers, as Miller observes, but the whole could not be such. The same happens very frequently to the fig-trees of this climate, sometimes the whole crop falls off, when they are about the size of filberts; that is, while they are still in flower, which though concealed within the fig, must precede the swelling of the seeds, whether these be impregnated or not.

A correspondent fact occurred to me a few years ago. I had six young trees of the Ischia fig with fruit on them in pots in a stove. On removing them into larger boxes the figs fell off, which I ascribed to the increased vigour of the plants; as they protruded very vigorous shoots occasioned by the accumulation of new soil round their roots. Perhaps these plants might rather be said to have been in flower than in

fruit, and perhaps these flowers were all male ones only, or accompanied only with imperfect female ones?

Whence I conclude, that about the season when the corals of these flowers with their stamens and stigmas die, the trees generate and nourish too many new leaf-buds, owing to the facility with which they can produce the new caudexes of these young buds down the bark; and that by the whole of the vegetable sap-juice being derived to the new buds for their present growth, or to form reservoirs for their future growth, the pericarp and seeds, whether impregnated or not, are deprived of their due nutriment and fall off.

Hence I propose to tie waxed thread or fine wire round the twigs of pear-trees, which have usually miscarried, as soon as they are in flower, so as to compress, but not so as to strangulate them; or to wound the bark by a circular or semicircular incision, which might counteract their facility of procreating new leaf-buds; which I suspect would be more effectual in preventing the flowers from falling off, than pinching off the new leaf-buds, as they appear; which is recommended by Dr. Bradley in the management of fig-trees, and is done to vines in hot-houses; but which I found to be ineffectual on many fig-branches both in the natural ground and in pots, and ascribed its failure to the continuance of the efforts of the fig-tree to produce new leaf-buds; whereas in vines, I suppose, the grapes would ripen, whether the new leaf-buds remain or are destroyed.

5. *Give additional moisture, manure, and warmth, during the early part of the growth of fruit.* By additional moisture the fruit becomes larger; in hot-houses this may be effected two ways, one by watering the earth on which the vegetables grow, and another by producing steam by watering the warm

flues or floors; which will afterwards in the colder hours be again condensed, and settle in the form of dew on the fruit and leaves.

By supplying vegetables as well as animals with an abundance of fluid, they are liable to increase in bulk, both because the external cuticle which confines the growth of both of them, becomes relaxed, as is seen in the hands of those women, who have many hours been employed in washing; and also because the cutaneous absorbent vessels will thus imbibe more fluid from the external surface; and the cellular absorbents will therefore imbibe less from the internal cells, and consequently more mucus or fat will remain in them.

Thus in Lancashire, where premiums are given for large goose-berries, I am told, that some of those who are solicitous for the prizes, not only thin the fruit of a gooseberry-tree, so as to leave but two or three gooseberries on a branch, but then by supporting a tea-saucer under each of these gooseberries, bathe it for some weeks in so much water as to cover about a fourth part of it, which they call suckling the gooseberry.

There are two circumstances to be attended to in giving water to plants; which are, not to water them during the hot part of the day in summer, nor in the evenings of spring, when a frost may be expected; in both these circumstances we may be said to copy nature, as rain is generally preceded by a cloudy sky, and is never accompanied by frost; though that sometimes follows it, and is then very injurious to vegetation.

When plants have been long stimulated by a hot sunshine into violent action, if this stimulus of heat be too greatly and too suddenly diminished by the affusion of cold water, or by its sudden evaporation, their vessels cease to act, and death ensues; exactly

as has too frequently happened to those, who have bathed in a cold spring of water after having been heated by violent and continued exercise on a hot day. When severe frost follows the watering of plants, they are rendered torpid, and die by the too great and sudden diminution of the stimulus of heat; which is equally necessary to the activity of vegetable as to animal fibres; and in some instances the circulation of their fluids may be stopped by the congelation of them; and in others their vessels may be burst by the expansion attending the conversion of water into ice; or lastly, by the separation of their different fluids by congelation.

When an addition of manure can be procured, as where the black carbonic juice from a dung-hill mixed with water, or soap-suds, which have been used in washing, can be employed instead of water alone; it must undoubtedly add to the nutriment, and consequently enlarge the size of the fruit by that means also, as well as by the additional water.

Where too much moisture is given without at the same time an addition of warmth, some inconveniences are liable to occur, as a less aromatic and saccharine flavour of the fruit. When therefore fruits become nearly ripe, less water should be given them, unless it is convenient at the same time to increase the heat, in which they are immersed, as may be done in some hot-houses; and then the flavour of the fruit may be heightened, as well as its size increased, as shewn by Mr. Bastard in the Philosophical Transact. who planted pine-apple plants in vessels of water, and placed these vessels near the top of the hot-house, or on the fire-flues, for the purpose of supplying them with a greater heat; and produced by these means both larger, as he asserts, and better flavoured pine-apples.

On this important subject I shall transcribe his words, and shall only add, that steam from boiling water is now successfully used in some hot-houses for the growth both of vines and of pines, but must require some attention in the application of it; as it is occasionally conveyed through small apertures, which perforate a brick arch, which is constructed somewhat like the floor of a malt-kiln, where the water boils beneath the beds of bark or of soil; and is occasionally admitted into the room above, and thus supplies moisture and heat both to the ground and to the air of the hot-house.

“ My hot-house is covered with the best crown glass, which I apprehend gives more heat than the common sort of green glass generally used for hot-houses. In the front part of the house, and indeed any where in the lowest parts of it, the pine-apple plants will not thrive well in water. The way in which I treat them is as follows. I place a shelf near the highest part of the back wall, so that the pine-plants may stand without absolutely touching the glass, but as near it as can be. On this shelf I place pans full of water, about seven or eight inches deep; and in these pans I put the pine-apple plants, growing in the same pots of earth, as they are generally planted in to be plunged into the bark-bed in the common way; that is, I put the pot of earth with the pine-plant in it in the pan full of water: and as the water decreases, I constantly fill up the pan. I place either plants in fruit, or young plants as soon as they are well rooted, in these pans of water, and find they thrive equally well; the fruit reared this way is always much larger, as well as better flavoured, than when ripened in the bark-bed. I have more than once put only the plants themselves without any earth, I mean after they had roots, into these pans of water, with only water sufficient to keep the roots

always covered, and found them flourish beyond expectation. A neighbour of mine has placed a leaden cistern upon the top of the back flue, (in which, as it is in contact with the flue, the water is always warm, when there is fire in the house,) and finds his fruit excellent and large.

“ The way I account for this success is, that the warm air always ascending to the part, where this shelf is placed, as being the highest part of the house, keeps it much hotter than in any other part. The temperature at that place is, I believe seldom less than what is indicated by the 73d degree of Fahrenheit’s thermometer ; and when the sun shines, it is often at above 100 degrees ; the water the plants grow in seems to enable them to bear the greatest heat, if sufficient air be allowed ; and I often see the roots of the plants growing out of the holes in the bottom of the pot of earth, and shooting vigorously in the water.

“ It is not foreign to this purpose to mention, that, as a person was moving a large pine-plant from the hot-bed in my house last summer, which plant was just shewing fruit, by some accident he broke off the plant just above the earth in which it grew, and there was no root whatever left to it ; by way of experiment I took the plant, and fixed it upright in a pan of water (without any earth whatever) on the shelf ; it there soon threw out roots, and bore a pine-apple that weighed upwards of two pounds.”

Roxbury, Sept. 30th, 1809.

REV. JOHN T. KIRKLAND, D. D. *Recording Secretary of the Massachusetts Society for promoting Agriculture,*

SIR,

A Society has been formed in Great Britain, within a few years past, for the purpose of promoting horticultural improvements, a branch of agriculture if not as extensively useful as some others, at least claiming the merit of contributing to our comforts and innocent luxuries.

The persons who compose this society are among the most distinguished naturalists of that kingdom, and the publications which they have already made of their essays and experiments afford the most satisfactory evidence of their ability to contribute most essentially to the advancement of horticultural knowledge.

I shall select upon the present occasion, one specimen, which from its importance and complete success, both in Europe and in this country, I flatter myself will not be deemed unworthy of your attention.

An essay was read before that society on the 3d of May, 1808, addressed to them, by John Williams, Esq. giving an account of a new method of hastening the maturation of grapes.

This essay I have now the pleasure to communicate to the Trustees of the Agricultural Society, and I shall subjoin the results of an experiment which I have made upon several species of grapes, and which has been attended with the most perfect success.

Although from the greater degree of heat which prevails in our climate, we are not so frequently ex-

posed to the loss of our grapes by early frosts, yet the case not unfrequently occurs with us, and with respect to the more delicate sorts it often happens that we cannot bring them to perfect maturity.

In the experiments which I made upon Mr. Williams's plan, I endeavoured to follow his directions minutely, and I can say with confidence, that all the effects which he describes to have taken place with him were most satisfactorily produced with mine.

When my grapes had attained the size of full grown peas, I caused the bark to be removed from the stocks of several of my vines upon which I proposed to make the experiment, for the space of about one quarter of an inch, entirely removing the cortex and liber, so as to leave the alburnum completely exposed, without however in any degree wounding it.

The experiment this year was commenced about the 20th of July, but in some years it would be expedient to do it at an earlier period.

The several species on which the trial was made, were the black Syrian grape, which rarely if ever ripens in this country, in the open air; the common white sweet water; and the Miller cluster grape.

In four or five weeks, the effects of the experiment were very obvious, in the enlargement and superior vigour of that portion of the plant which was above the incision. The grapes also were of a much larger and fairer size, and on the 30th of August, the bunches on the Syrian and Miller grapes had already become highly coloured, and were of a deep purple colour, upon the branches on which the experiment was made, whilst all the bunches upon other branches of the same vine, still remained small and green.

The bunches upon the common sweetwater exhibited a difference equally striking, being at least,

twice as large as those upon branches on which no incision had been made, and of a bright transparent colour, inclining to amber, while those upon branches upon which no incision had been made, remained perfectly green.

The wounds made by the incisions, were on the first of September completely healed, and a perfect cicatrice had been formed, which connected the bark above and below, and no doubt can be entertained from the present appearances, that the plants on which the experiment has been tried, will enjoy as great or even perhaps greater degree of health than the others.

On the 21st of this month, I gathered several bunches for the table, which were very pleasant though not perfectly ripened; and at this day it is very doubtful, whether my grapes in ordinary circumstances, will ripen at all; they certainly will not unless the autumnal frosts should be uncommonly delayed.

I should have exhibited a specimen to the Society of these grapes, but I have already taken off every bunch, except one of the large St. Peters grape, which I wish to reserve to see whether it will ripen, which it has never yet done in my ground. It is now twice as large as other bunches on the same branch, and is perfectly black, while the others are only faintly coloured.

I have the honour to be,

Respectfully,

Your humble servant,

J. LOWELL.

Postscript, June 11, 1810.

I find this Spring, that the abovementioned branches are in as good health, and as full of fruit as any others upon my vines.

To the Hon. JOHN LOWELL, Esq.

SIR,

The very great destruction of fruit trees, occasioned by mice and moles, during the winters of the two or three last years, has made it an object of the utmost importance to discover the best means of preventing the mischief, or to invent a remedy for the evil, after it has taken place. So prodigiously have these pernicious vermin multiplied of late, in some places, as to threaten the destruction, not only of fruit trees, but also of forest trees, and the grass of our best mowing fields. During the winter of 1808 and 1809, they were known in some places to attack a whole copse of small trees, leaving scarcely one ungirdled; and in many mowing fields, to gutter almost the whole surface of the ground, for acres together, with their burrows and paths. Instead of molesting only the small trees in our orchards, as usual, they have of late completely girdled apple trees, in some instances, of nearly three feet in circumference, and destroyed them.

As this mischief is seldom done but in the severity of winter, when these vermin are driven to the roots of the trees for shelter, and are deprived of their ordinary subsistence by the frost and snow, the most effectual way to prevent their injury is, in the month of November, just before the winter sets in, to clear away all the rubbish, and furze from around the roots of young trees, leaving the ground bare, and then to put a coat of dry ashes all around. The roots of the tree then affording them no shelter above ground, and they having a natural aversion to burrowing in ashes, they will be driven for shelter to some other place, and your trees will thereby in a great measure be preserved from their mischief. The ashes also will abundantly compensate you for the trouble and expense, causing

your trees the year following to thrive and flourish exceedingly.

Another method of some use is, in the early part of winter, after the first snow, to shovel snow around the roots of the trees, and then tread it down hard, by which it will freeze, and become solid like ice, through which they cannot easily penetrate. But this method is by no means sure, as they will frequently burrow under the ice, and sometimes injure the roots underneath, and in the least thaw pass up and injure the tree.

But after the injury has been done, and your tree is completely girdled, and all the bark eaten off round the tree, to the hard wood, I know of but one remedy, to preserve the tree alive, although many experiments have been tried. A tree girdled in this manner, having no means of conveying the sap and nourishment from the roots up into the body and branches above, must wither and die. The usual way among farmers is, in such cases, to dig up the trees and set out new ones. Sometimes they are cut off and headed down below the place eaten, and new wood, in length of time, will shoot out and make a second tree.

But it occurred to me that if any artificial way could be discovered to renew, or make a communication of the circulating vessels of the lower sections of the bark and sap eaten off, with the upper, so as to convey up the juices and nourishment from the roots into the branches, the tree might be made to live and flourish.

Accordingly choosing a fine thrifty tree, about twelve inches in circumference, as soon as the snow was off the ground in the spring, which had been completely girdled by the mice, and all the bark eaten off all round to the hard wood, more than four inches wide, like a belt; I took a sharp knife and evened the edges of the lower and upper circle of

the bark eaten off; then took a scion from the tree about the bigness of a pipe stem, and an inch longer at each end than the space where the bark had been eaten off around the tree, split the scion lengthwise, and shaved the split side down, so as to fit to the body of the tree, being very careful not to disturb the bark of the scion; then cutting away the lower circle, until it came to fresh bark, made a perpendicular slit one inch down towards the root of the tree, then crossed this at the bottom, with a horizontal slit, half an inch on each side, as in budding; then gently peeled up the bark on each side, and fitted the lower end of the scion in, and squeezed the bark down around it; then fitted the upper end of the scion into the upper circle of the bark eaten off, in all respects, as I had done the lower. In this manner I placed six scions all round the body of the tree; then covered it over an inch or more thick with Forsaith's composition, and howed the dirt up all round the roots of the tree to keep it moist.

The tree did not put out its leaves so soon, nor so vigorously, at first, as the other trees; but by the middle of summer it flourished very well, and in the fall there was no apparent difference between it and the surrounding trees. It bore some fruit the last year, and is now covered with young fruit, and appears as healthy and flourishing, as any tree in the garden.

In the fall of the year, after this operation, I opened the roots of this tree, and tore away the plaster, and to my surprise, I found that four of the six scions had taken, and grown to the size of nearly an inch in diameter. The other two did not take, by which means, the tree is a little flat on one side. I lately opened the tree again, and have found that it will soon be covered with bark again, except the side where the scions did not take.

This experiment I have known to have been tried several times since with equal success. Mr. Isaac Davis, of Roxbury, a very intelligent and respectable farmer, in the spring of the year, 1809, treated in the same manner a large apple tree of more than twenty-seven inches in circumference, which had been eaten off all round, for a space of more than four inches. The tree flourished, and bore fruit the last year, and is now covered with a great abundance of fruit; and is extremely thrifty, having recently examined it for the purpose of ascertaining its present state. Mr. Davis made use of common clay mortar in his experiment, instead of Forsaith's composition, which he thinks, answers as good a purpose.

Knowing, Sir, the interest you feel in every thing that tends to improvement in agriculture, and husbandry, I have taken the liberty to address to you the foregoing experiments and observations, which, if in your opinion should be deemed of public utility, you are requested to communicate in any manner you think most useful to society.

I am, with the highest sentiments of respect,
Your most obedient and very humble serv't.

LUTHER RICHARDSON.

Roxbury, June 10, 1810.

Dr. *The Massachusetts Agricultural Society, in account with* Thomas L. Winthrop. Cr.

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We the Subscriber, appointed a Committee by the Massachusetts Society for promoting Agriculture, at their annual meeting, in February last, to examine the Treasurer's account, having attended to that business, do find the same well vouched and rightly cast, and a balance of eight hundred and ninety-nine dollars and ninety cents due to said Society from said Treasurer. We also find in his hands the evidences of the property above enumerated.

Boston, June 12, 1840.

JOSEPH RUSSELL,
BENJAMIN BUSSEY, } Committee.

JOSEPH RUSSELL,
BENJAMIN BUSSEY,
} Committee.

